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

b-baryon ADMIXTURE MEAN LIFE

These measurements of the *b*-baryon mean life are averages over the species of *b*-baryon particles produced, weighted by their semileptonic branching ratios, unless otherwise stated. Only the measurements at high energy are averaged since it is expected that the admixtures of *b* baryons from Z decay and 1.8 TeV $p\overline{p}$ collisions should not differ significantly.

"OUR EVALUATION" is an average of the data listed below performed by the LEP B Lifetimes Working Group as described in our review "Production and Decay of *b*-flavored Hadrons" in the $B^{\pm}$ Section of the Listings. The averaging procedure takes into account correlations between the measurements and asymmetric lifetime errors.

VALUE (10^{-12} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1.15±0.08 OUR EVALUATION					
$1.46^{+0.22}_{-0.21}{}^{+0.07}_{-0.09}$		ABREU	96D	DLPH	Excess $\Lambda \ell^- \pi^+$, decay lengths
$1.10^{+0.19}_{-0.17}\pm0.09$		ABREU	96D	DLPH	Excess $\Lambda \mu^-$ impact parameters
$1.16\pm0.11\pm0.06$		AKERS	96	OPAL	Excess $\Lambda \ell^-$, decay lengths and impact parameters
$1.27^{+0.35}_{-0.29}\pm0.09$		ABREU	95S	DLPH	Excess $p \mu^-$, decay lengths
$1.05^{+0.12}_{-0.11}\pm0.09$	290	BUSKULIC	95L	ALEP	Excess $\Lambda \ell^-$, impact parameters
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.25\pm0.11\pm0.05$		[1] ABREU	96D	DLPH	Combined result
$1.16\pm0.11\pm0.06$		[2] AKERS	96	OPAL	Combined result
$1.04^{+0.48}_{-0.38}\pm0.10$	11	[3] ABREU	93F	DLPH	Excess $\Lambda \mu^-$, decay lengths
$1.05^{+0.23}_{-0.20}\pm0.08$	157	[4] AKERS	93	OPAL	Excess $\Lambda \ell^-$, decay lengths
$1.12^{+0.32}_{-0.29}\pm0.16$	101	[5] BUSKULIC	92I	ALEP	Excess $\Lambda \ell^-$, impact parameters

[1] Combined result of the three ABREU 96D methods and ABREU 95S.
[2] Combined result of AKERS 96 impact parameter and decay length methods.
[3] ABREU 93F superseded by ABREU 96D.
[4] AKERS 93 superseded by AKERS 96.
[5] BUSKULIC 92I superseded by BUSKULIC 95L.

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 in Z decay (or high-energy $p\overline{p}$), branching ratios, and detection efficiencies. They scale with the LEP Λ_b production fraction B($b \to \Lambda_b$) and are evaluated for our value B($b \to \Lambda_b$) = (13.2 ± 4.1)%.

The branching fractions B($\Lambda_b^0 \to \Lambda \ell^- \overline{\nu}_\ell$ 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($b \to \Lambda_b$) were used to determine B($b \to \Lambda_b$), as described in the note "Production and Decay of b-Flavored Hadrons."

	Mode	Fraction (Γ_i/Γ)
Γ_1	$p \mu^- \overline{\nu}$ anything	(3.7± 1.7) %
Γ_2	$\Lambda \ell^- \overline{\nu}_\ell$ anything	(2.4± 0.8) %
Γ_3	$\Lambda_c^+ \ell^- \overline{\nu}_\ell$ anything	(10 ± 4) %
Γ_4	$\Lambda/\overline{\Lambda}$ anything	$(17\ ^{+11}_{-\ 8})$ %
Γ_5	$\Xi^- \ell^- \overline{\nu}_\ell$ anything	seen

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

$\Gamma(p \mu^- \overline{\nu}\text{anything})/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.037^{+0.014}_{-0.012}\pm0.012}$	125	[6] ABREU	95S	DLPH	$e^+e^- \to Z$

[6] ABREU 95S reports [B($\Lambda_b^0 \to p \mu^- \overline{\nu}$ anything) × B($b \to \Lambda_b$)] = 0.0049 ± $0.0011^{+0.0015}_{-0.0011}$. We divide by our best value B($b \to \Lambda_b$) = (13.2 ± 4.1) × 10^{-2}. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda \ell^- \overline{\nu}_\ell \text{anything})/\Gamma_{\text{total}}$ Γ_2/Γ

The values and averages in this section serve only to show what values result if one assumes our B($b \to \Lambda_b$). They cannot be thought of as measurements since the underlying product branching fractions were also used to determinine B($b \to \Lambda_b$) as described in the note on "Production and Decay of b-Flavored Hadrons."

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.024±0.008 OUR AVERAGE					
0.022±0.003±0.007		[7] AKERS	96	OPAL	Excess of $\Lambda \ell^-$ over $\Lambda \ell^+$
0.023±0.005±0.007	262	[8] ABREU	95S	DLPH	Excess of $\Lambda \ell^-$ over $\Lambda \ell^+$
0.046±0.009±0.014	290	[9] BUSKULIC	95L	ALEP	Excess of $\Lambda \ell^-$ over $\Lambda \ell^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	157	[10] AKERS	93	OPAL	Excess of $\Lambda \ell^-$ over $\Lambda \ell^+$
0.053±0.016±0.016	101	[11] BUSKULIC	92I	ALEP	Excess of $\Lambda \ell^-$ over $\Lambda \ell^+$

[7] AKERS 96 reports [B($\Lambda_b^0 \to \Lambda \ell^- \overline{\nu}_\ell$ anything) × B($b \to \Lambda_b$)] = 0.00291 ± 0.00023 ± 0.00025. We divide by our best value B($b \to \Lambda_b$) = (13.2 ± 4.1) × 10^{-2}. Our first

error is their experiment's error and our second error is the systematic error from using our best value.

[8] ABREU 95S reports $[B(\Lambda_b^0 \rightarrow \Lambda \ell^- \overline{\nu}_\ell \text{anything}) \times B(b \rightarrow \Lambda_b)] = 0.0030 \pm 0.0006 \pm 0.0004$. We divide by our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[9] BUSKULIC 95L reports $[B(\Lambda_b^0 \rightarrow \Lambda \ell^- \overline{\nu}_\ell \text{anything}) \times B(b \rightarrow \Lambda_b)] = 0.0061 \pm 0.0006 \pm 0.0010$. We divide by our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[10] AKERS 93 superseded by AKERS 96.

[11] BUSKULIC 92I reports $[B(\Lambda_b^0 \rightarrow \Lambda \ell^- \overline{\nu}_\ell \text{anything}) \times B(b \rightarrow \Lambda_b)] = 0.0070 \pm 0.0010 \pm 0.0018$. We divide by our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Superseded by BUSKULIC 95L.

$\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell \text{anything})/\Gamma_{\text{total}}$ — Γ_3/Γ

The values and averages in this section serve only to show what values result if one assumes our $B(b \rightarrow \Lambda_b)$. They cannot be thought of as measurements since the underlying product branching fractions were also used to determinine $B(b \rightarrow \Lambda_b)$ as described in the note on "Production and Decay of b-Flavored Hadrons."

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.10 ±0.04 OUR AVERAGE					
$0.089^{+0.031}_{-0.025} \pm 0.028$	29	[12] ABREU	95S	DLPH	$e^+ e^- \rightarrow Z$
$0.11 \pm 0.03 \pm 0.04$	55	[13] BUSKULIC	95L	ALEP	$e^+ e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.23 \pm 0.09 \pm 0.07$	21	[14] BUSKULIC	92E	ALEP	$\Lambda_c^+ \rightarrow p K^- \pi^+$

[12] ABREU 95S reports $[B(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell \text{anything}) \times B(b \rightarrow \Lambda_b)] = 0.0118 \pm 0.0026^{+0.0031}_{-0.0021}$. We divide by our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[13] BUSKULIC 95L reports $[B(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell \text{anything}) \times B(b \rightarrow \Lambda_b)] = 0.0151 \pm 0.0029 \pm 0.0023$. We divide by our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[14] BUSKULIC 92E reports $[B(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell \text{anything}) \times B(b \rightarrow \Lambda_b)] = 0.030 \pm 0.007 \pm 0.009$. We divide by our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Superseded by BUSKULIC 95L.

$\Gamma(\Lambda/\overline{\Lambda}\text{anything})/\Gamma_{\text{total}}$ — Γ_4/Γ

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{0.17^{+0.09}_{-0.06} \pm 0.05}$	[15] ABREU	95C	DLPH	$e^+ e^- \rightarrow Z$

[15] ABREU 95C reports $0.28^{+0.17}_{-0.12}$ for $B(b \rightarrow \Lambda_b) = 0.08 \pm 0.02$. We rescale to our best value $B(b \rightarrow \Lambda_b) = (13.2 \pm 4.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Xi^- \ell^- \overline{\nu}_\ell \text{anything})/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
seen	[16] BUSKULIC	96T	ALEP	Excess $\Xi^- \ell^-$ over $\Xi^- \ell^+$
seen	ABREU	95V	DLPH	Excess $\Xi^- \ell^-$ over $\Xi^- \ell^+$

[16] BUSKULIC 96T measures $[B(b \to \Xi_b) \times B(\Xi_b \to \Xi^- \ell^- \overline{\nu}_\ell \text{anything})] = (5.4 \pm 1.1 \pm 0.8) \times 10^{-4}$ per lepton species, averaged over e and μ.

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

ABREU	96D	ZPHY C71 199	+Adam, Adye, Agasi+	(DELPHI Collab.)
AKERS	96	ZPHY C69 195	+Alexander, Allison, Altekamp+	(OPAL Collab.)
BUSKULIC	96T	PL B384 449	+De Bonis, Decamp, Ghez+	(ALEPH Collab.)
ABREU	95C	PL B347 447	+Adam, Adye, Agasi+	(DELPHI Collab.)
ABREU	95S	ZPHY C68 375	+Adam, Adye, Agasi+	(DELPHI Collab.)
ABREU	95V	ZPHY C68 541	+Adam, Adye, Agasi+	(DELPHI Collab.)
BUSKULIC	95L	PL B357 685	+Casper, De Bonis, Decamp+	(ALEPH Collab.)
ABREU	93F	PL B311 379	+Adam, Adye, Agasi+	(DELPHI Collab.)
AKERS	93	PL B316 435	+Alexander, Allison, Anderson+	(OPAL Collab.)
BUSKULIC	92E	PL B294 145	+Decamp, Goy, Lees, Minard+	(ALEPH Collab.)
BUSKULIC	92I	PL B297 449	+Decamp, Goy, Lees+	(ALEPH Collab.)