



$$I(J^P) = \frac{1}{2}(\frac{1}{2}^+) \text{ Status: } ***$$

I, J, P need confirmation.

In the quark model, Ξ_b^0 and Ξ_b^- are an isodoublet (usb, dsb) state; the lowest Ξ_b^0 and Ξ_b^- ought to have $J^P = 1/2^+$. None of I, J , or P have actually been measured.

Ξ_b MASSES

Ξ_b^- MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
5794.9 ± 0.9 OUR AVERAGE	Includes data from the datablock that follows this one. Error includes scale factor of 1.1.		
5795.8 ± 0.9 ± 0.4	¹ AAIJ	13AV LHCb	pp at 7 TeV
5796.7 ± 5.1 ± 1.4	² AALTONEN	11X CDF	$p\bar{p}$ at 1.96 TeV
5790.9 ± 2.6 ± 0.8	³ AALTONEN	09AP CDF	$p\bar{p}$ at 1.96 TeV
5774 ± 11 ± 15	⁴ ABAZOV	07K D0	$p\bar{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
5792.9 ± 2.5 ± 1.7	⁵ AALTONEN	07A CDF	Repl. by AALTONEN 09AP

¹ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays.

² Measured in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$ with $25.8^{+5.5}_{-5.2}$ candidates.

³ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 66^{+14}_{-9} candidates.

⁴ Observed in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with $15.2 \pm 4.4^{+1.9}_{-0.4}$ candidates, a significance of 5.5 sigma.

⁵ Observed in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 17.5 ± 4.3 candidates, a significance of 7.7 sigma.

Ξ_b^0 MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
5793.1 ± 2.5 OUR AVERAGE	Error includes scale factor of 1.1.		
5794.3 ± 2.4 ± 0.7	AAIJ	14H LHCb	pp at 7 TeV
5787.8 ± 5.0 ± 1.3	⁶ AALTONEN	11X CDF	$p\bar{p}$ at 1.96 TeV

⁶ Measured in $\Xi_b^0 \rightarrow \Xi_c^+ \pi^-$ with $25.3^{+5.6}_{-5.4}$ candidates.

$m_{\Xi_b^-} - m_{\Lambda_b^0}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
176.2 ± 0.9 ± 0.1	AAIJ	13AV LHCb	pp at 7 TeV

$m_{\Xi_b^0} - m_{\Lambda_b^0}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
174.8 ± 2.4 ± 0.5	AAIJ	14H LHCb	pp at 7 TeV

$$m_{\Xi_b^-} - m_{\Xi_b^0}$$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$3.1 \pm 5.6 \pm 1.3$	⁷ AALTONEN	11X	CDF $p\bar{p}$ at 1.96 TeV

⁷ Derived from measurements in $\Xi_b^0 \rightarrow \Xi_c^+ \pi^-$ and $\Xi_b^- \rightarrow J/\psi \Xi^-$ from AALTONEN 09AP taking correlated systematic uncertainties into account.

Ξ_b^- MEAN LIFE

VALUE (10^{-12} s)	DOCUMENT ID	TECN	COMMENT
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$1.56^{+0.27}_{-0.25}$ OUR EVALUATION

$1.56^{+0.27}_{-0.25} \pm 0.02$ ⁸ AALTONEN 09AP CDF $p\bar{p}$ at 1.96 TeV

⁸ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 66^{+14}_{-9} candidates.

Ξ_b^0 MEAN LIFE

“OUR EVALUATION” is an average using rescaled values of the data listed below. The average and rescaling were performed by the Heavy Flavor Averaging Group (HFAG) and are described at <http://www.slac.stanford.edu/xorg/hfag/>. The averaging/rescaling procedure takes into account correlations between the measurements and asymmetric lifetime errors.

VALUE (10^{-12} s)	EVTS	DOCUMENT ID	TECN	COMMENT
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$1.49^{+0.19}_{-0.18}$ OUR EVALUATION

$1.56^{+0.27}_{-0.25} \pm 0.02$ ⁹ AALTONEN 09AP CDF $p\bar{p}$ at 1.96 TeV

$1.48^{+0.40}_{-0.31} \pm 0.12$ ¹⁰ ABDALLAH 05C DLPH $e^+ e^- \rightarrow Z^0$

$1.35^{+0.37}_{-0.28} \pm 0.15$ ¹¹ BUSKULIC 96T ALEP $e^+ e^- \rightarrow Z$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$1.5^{+0.7}_{-0.4} \pm 0.3$ ⁸ ¹² ABREU 95v DLPH Repl. by ABDALLAH 05C

⁹ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 66^{+14}_{-9} candidates.

¹⁰ Used the decay length of Ξ^- accompanied by a lepton of the same sign.

¹¹ Excess $\Xi^- \ell^-$, impact parameters.

¹² Excess $\Xi^- \ell^-$, decay lengths.

Ξ_b DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor
$\Gamma_1 \quad \Xi_b^- \rightarrow \Xi^- \ell^- \bar{\nu}_\ell X \times B(\bar{b} \rightarrow \Xi_b)$	$(3.9 \pm 1.2) \times 10^{-4}$	1.4
$\Gamma_2 \quad \Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-)$	$(1.02^{+0.26}_{-0.21}) \times 10^{-5}$	
$\Gamma_3 \quad \Xi_b^0 \rightarrow p D^0 K^- \times B(\bar{b} \rightarrow \Xi_b)$	$(1.8^{+1.3}_{-1.1}) \times 10^{-6}$	
$\Gamma_4 \quad \Xi_b^0 \rightarrow \Lambda_c^+ K^- \times B(\bar{b} \rightarrow \Xi_b)$	$(8 \pm 7) \times 10^{-7}$	

Ξ_b BRANCHING RATIOS

$\Gamma(\Xi^- \ell^- \bar{\nu}_\ell \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma_{\text{total}}$ Γ_1/Γ

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.9 ± 1.2 OUR AVERAGE	Error includes scale factor of 1.4.		
$3.0 \pm 1.0 \pm 0.3$	ABDALLAH	05C DLPH	$e^+ e^- \rightarrow Z^0$
$5.4 \pm 1.1 \pm 0.8$	BUSKULIC	96T ALEP	Excess $\Xi^- \ell^-$ over $\Xi^- \ell^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$5.9 \pm 2.1 \pm 1.0$	ABREU	95V DLPH	Repl. by ABDALLAH 05C

$\Gamma(J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))/\Gamma_{\text{total}}$ Γ_2/Γ

<u>VALUE (units 10^{-4})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.102^{+0.026}_{-0.021}$ OUR AVERAGE			
$0.098^{+0.023}_{-0.016} \pm 0.014$	¹³ AALTONEN	09AP CDF	$p\bar{p}$ at 1.96 TeV
$0.16 \pm 0.07 \pm 0.02$	¹⁴ ABAZOV	07K D0	$p\bar{p}$ at 1.96 TeV

¹³ AALTONEN 09AP reports $[\Gamma(\Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))/\Gamma_{\text{total}}] / [B(\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0))] = 0.167^{+0.037}_{-0.025} \pm 0.012$ which we multiply by our best value $B(\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0)) = (5.8 \pm 0.8) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

¹⁴ ABAZOV 07K reports $[\Gamma(\Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))/\Gamma_{\text{total}}] / [B(\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0))] = 0.28 \pm 0.09^{+0.09}_{-0.08}$ which we multiply by our best value $B(\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0)) = (5.8 \pm 0.8) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(p D^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma_{\text{total}}$ Γ_3/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$(1.8 \pm 0.4^{+1.2}_{-1.0}) \times 10^{-6}$	¹⁵ AAIJ	14H LHCB	pp at 7 TeV

¹⁵ AAIJ 14H reports $[\Gamma(\Xi_b^0 \rightarrow p D^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma_{\text{total}}] / [B(\bar{b} \rightarrow b\text{-baryon})] / [B(\Lambda_b^0 \rightarrow p D^0 K^-)] = 0.44 \pm 0.09 \pm 0.06$ which we multiply by our best values $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$, $B(\Lambda_b^0 \rightarrow p D^0 K^-) = (4.3^{+3.0}_{-2.4}) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(\Lambda_c^+ K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma(p D^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))$ Γ_4/Γ_3

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.44 \pm 0.24 \pm 0.12$	¹⁶ AAIJ	14H LHCB	pp at 7 TeV

¹⁶ AAIJ 14H reports $[\Gamma(\Xi_b^0 \rightarrow \Lambda_c^+ K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma(\Xi_b^0 \rightarrow p D^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))] \times [B(\Lambda_c^+ \rightarrow p K^- \pi^+)] / [B(D^0 \rightarrow K^- \pi^+)] = 0.57 \pm 0.22 \pm 0.21$ which we multiply or divide by our best values $B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$, $B(D^0 \rightarrow K^- \pi^+) = (3.88 \pm 0.05) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

Ξ_b REFERENCES

AAIJ	14H	PR D89 032001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AV	PRL 110 182001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	11X	PRL 107 102001	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	09AP	PR D80 072003	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	07A	PRL 99 052002	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	07K	PRL 99 052001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABDALLAH	05C	EPJ C44 299	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
BUSKULIC	96T	PL B384 449	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
ABREU	95V	ZPHY C68 541	P. Abreu <i>et al.</i>	(DELPHI Collab.)
