

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

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^- MASS **Ξ_b^- MASSES**

5794.5 ± 1.4 OUR AVERAGE Includes data from the datablock that follows this one. Error includes scale factor of 4.0. See the ideogram below.

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
5797.72 ± 0.46 ± 0.31	1 AAIJ	14BJ LHCb	pp at 7, 8 TeV
5793.4 ± 1.8 ± 0.7	2 AALTONEN	14B CDF	$p\bar{p}$ at 1.96 TeV
5795.8 ± 0.9 ± 0.4	3 AAIJ	13AV LHCb	pp at 7 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. • • •

5796.7 ± 5.1 ± 1.4	5 AALTONEN	11X CDF	Repl. by AALTONEN 14B
5790.9 ± 2.6 ± 0.8	6 AALTONEN	09AP CDF	Repl. by AALTONEN 14B
5792.9 ± 2.5 ± 1.7	7 AALTONEN	07A CDF	Repl. by AALTONEN 09AP

¹ Reconstructed in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-, \Xi_c^0 \rightarrow p K^- K^- \pi^+$ decays. Reference Λ_b^0 mass 5619.30 ± 0.34 MeV from AAIJ 14AA.

² Uses $\Xi_b^- \rightarrow J/\psi \Xi^-$ and $\Xi_c^0 \pi^-$ decays.

³ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays.

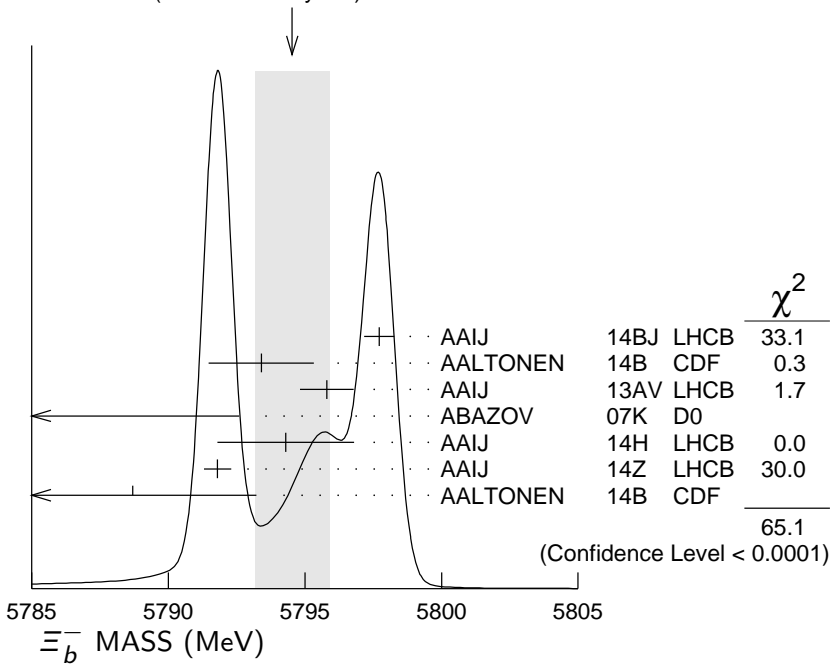
⁴ Observed in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with $15.2 \pm 4.4^{+1.9}_{-0.4}$ candidates, a significance of 5.5 sigma.

⁵ Measured in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$ with $25.8^{+5.5}_{-5.2}$ candidates.

⁶ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 66^{+14}_{-9} candidates.

⁷ Observed in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 17.5 ± 4.3 candidates, a significance of 7.7 sigma.

WEIGHTED AVERAGE
5794.5 ± 1.4 (Error scaled by 4.0)



Ξ_b^0 MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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The data in this block is included in the average printed for a previous datablock.

5791.9 ± 0.5 OUR AVERAGE

5794.3 ± 2.4 ± 0.7	AAIJ	14H	LHCB pp at 7 TeV
5791.80 ± 0.39 ± 0.31	¹ AAIJ	14Z	LHCB pp at 7, 8 TeV
5788.7 ± 4.3 ± 1.4	² AALTONEN	14B	CDF $p\bar{p}$ at 1.96 TeV

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

5787.8 ± 5.0 ± 1.3	³ AALTONEN	11X	CDF Repl. by AALTONEN 14B
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¹ Uses $\Xi_b^0 \rightarrow \Xi_c^+ \pi^-$ and $\Xi_c^+ \rightarrow p K^- \pi^+$ decays. The measurement comes from the mass difference of Ξ_b^0 and Λ_b^0 .

² Uses $\Xi_b^0 \rightarrow \Xi_c^+ \pi^-$ decays.

³ 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
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177.9 ± 0.9 OUR AVERAGE Error includes scale factor of 2.1.

178.36 ± 0.46 ± 0.16	¹ AAIJ	14BJ	LHCB pp at 7, 8 TeV
176.2 ± 0.9 ± 0.1	² AAIJ	13AV	LHCB pp at 7 TeV

¹ Reconstructed in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$, $\Xi_c^0 \rightarrow p K^- K^- \pi^+$ decays. Reference $\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-$.

² Reconstructed in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays.

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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172.5 ± 0.4 OUR AVERAGE

174.8 ± 2.4 ± 0.5	AAIJ	14H	LHCB pp at 7 TeV
172.44 ± 0.39 ± 0.17	¹ AAIJ	14Z	LHCB pp at 7, 8 TeV

¹ Uses $\Xi_b^0 \rightarrow \Xi_c^+ \pi^-$ and $\Xi_c^+ \rightarrow p K^- \pi^+$ decays.

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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5.9 ± 0.6 OUR AVERAGE

5.92 ± 0.60 ± 0.23	¹ AAIJ	14BJ	LHCB pp at 7, 8 TeV
3.1 ± 5.6 ± 1.3	² AALTONEN	11X	CDF $p\bar{p}$ at 1.96 TeV

¹ Reconstructed in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$, $\Xi_c^0 \rightarrow p K^- K^- \pi^+$ decays. Uses $m(\Xi_b^0) - m(\Lambda_b^0) = 172.44 \pm 0.39 \pm 0.17$ MeV from AAIJ 14Z.

² 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

“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.

 Ξ_b^- MEAN LIFE

<u>VALUE (10^{-12} s)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.560 ± 0.040 OUR EVALUATION			
1.57 ± 0.04 OUR AVERAGE	Error includes scale factor of 1.1.		
1.599 ± 0.041 ± 0.022	¹ AAIJ	14BJ LHCb	pp at 7, 8 TeV
1.55 $^{+0.10}_{-0.09}$ ± 0.03	² AAIJ	14T LHCb	pp at 7, 8 TeV
1.36 ± 0.15 ± 0.02	AALTONEN	14B CDF	$p\bar{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.56 $^{+0.27}_{-0.25}$ ± 0.02	³ AALTONEN	09AP CDF	Repl. by AALTONEN 14B
¹ Reconstructed in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$, $\Xi_c^0 \rightarrow p K^- K^- \pi^+$ decays. Reference Λ_b^0 lifetime $1.479 \pm 0.009 \pm 0.010$ ps from AAIJ 14U.			
² Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays.			
³ Measured in $\Xi_b^- \rightarrow J/\psi \Xi^-$ decays with 66^{+14}_{-9} candidates.			

 Ξ_b^0 MEAN LIFE

<u>VALUE (10^{-12} s)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.464 ± 0.031 OUR EVALUATION			
1.477 ± 0.026 ± 0.019	¹ AAIJ	14Z LHCb	pp at 7, 8 TeV
¹ Uses $\Xi_b^0 \rightarrow \Xi_c^+ \pi^-$ and $\Xi_c^+ \rightarrow p K^- \pi^+$ decays. The measurement comes from the value of relative lifetime of Ξ_b^0 to Λ_b^0 .			

 Ξ_b MEAN LIFE

<u>VALUE (10^{-12} s)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.48 $^{+0.40}_{-0.31}$ ± 0.12	¹ ABDALLAH	05C DLPH	$e^+ e^- \rightarrow Z^0$
1.35 $^{+0.37}_{-0.28}$ $^{+0.15}_{-0.17}$	² BUSKULIC	96T ALEP	$e^+ e^- \rightarrow Z$
1.5 $^{+0.7}_{-0.4}$ ± 0.3	³ ABREU	95V DLPH	Repl. by ABDALLAH 05C
¹ Used the decay length of Ξ^- accompanied by a lepton of the same sign.			
² Excess $\Xi^- \ell^-$, impact parameters.			
³ Excess $\Xi^- \ell^-$, decay lengths.			

MEAN LIFE RATIOS

$\tau_{\Xi_b^-} / \tau_{\Lambda_b^0}$ mean life ratio

VALUE	DOCUMENT ID	TECN	COMMENT
1.089 ± 0.026 ± 0.011	¹ AAIJ	14BJ LHCB	pp at 7, 8 TeV

¹ Reconstructed in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$, $\Xi_c^0 \rightarrow p K^- K^- \pi^+$ decays. Reference $\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-$.

$\tau_{\Xi_b^-} / \tau_{\Xi_b^0}$ mean life ratio

VALUE	DOCUMENT ID	TECN	COMMENT
1.083 ± 0.032 ± 0.016	¹ AAIJ	14BJ LHCB	pp at 7, 8 TeV

¹ Reconstructed in $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$, $\Xi_c^0 \rightarrow p K^- K^- \pi^+$ decays. Uses Ξ_b^0 measurements from AAIJ 14Z.

Ξ_b DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
$\Gamma_1 \quad \Xi_b^- \rightarrow \Xi^- \ell^- \bar{\nu}_\ell X \times B(\bar{b} \rightarrow \Xi_b)$	$(3.9 \pm 1.2) \times 10^{-4}$	S=1.4
$\Gamma_2 \quad \Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-)$	$(1.02^{+0.26}_{-0.21}) \times 10^{-5}$	
$\Gamma_3 \quad \Xi_b^0 \rightarrow p D^0 K^- \times B(\bar{b} \rightarrow \Xi_b)$	$(1.8 \pm 0.6) \times 10^{-6}$	
$\Gamma_4 \quad \Xi_b^0 \rightarrow p \bar{K}^0 \pi^- \times B(\bar{b} \rightarrow \Xi_b)/B(\bar{b} \rightarrow B^0)$	$< 1.6 \times 10^{-6}$	CL=90%
$\Gamma_5 \quad \Xi_b^0 \rightarrow p K^0 K^- \times B(\bar{b} \rightarrow \Xi_b)/B(\bar{b} \rightarrow B^0)$	$< 1.1 \times 10^{-6}$	CL=90%
$\Gamma_6 \quad \Xi_b^0 \rightarrow \Lambda_c^+ K^- \times B(\bar{b} \rightarrow \Xi_b)$	$(6 \pm 4) \times 10^{-7}$	
$\Gamma_7 \quad \Xi_b^- \rightarrow \Lambda_b^0 \pi^- \times B(b \rightarrow \Xi_b^-)/B(b \rightarrow \Lambda_b^0)$	$(5.7 \pm 2.0) \times 10^{-4}$	

Ξ_b BRANCHING RATIOS

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

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
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3.9 ± 1.2 OUR AVERAGE Error includes scale factor of 1.4.

3.0 ± 1.0 ± 0.3	ABDALLAH	05C DLPH	$e^+ e^- \rightarrow Z^0$
5.4 ± 1.1 ± 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 ± 2.1 ± 1.0	ABREU	95V DLPH	Repl. by ABDALLAH 05C
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$\Gamma(J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
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0.102^{+0.026}_{-0.021} OUR AVERAGE

0.098 ^{+0.023} _{-0.016} ± 0.014	¹ AALTONEN	09AP CDF	$p\bar{p}$ at 1.96 TeV
0.16 ± 0.07 ± 0.02	² ABAZOV	07K D0	$p\bar{p}$ at 1.96 TeV

¹ AALTONEN 09AP reports $[\Gamma(\Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))/\Gamma_{\text{total}}] / [B(\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0))] = 0.167_{-0.025}^{+0.037} \pm 0.012$ 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.

² ABAZOV 07K reports $[\Gamma(\Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))/\Gamma_{\text{total}}] / [B(\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0))] = 0.28 \pm 0.09_{-0.08}^{+0.09}$ 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.

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

VALUE	DOCUMENT ID	TECN	COMMENT
$(1.8 \pm 0.4 \pm 0.4) \times 10^{-6}$	¹ AAIJ	14H LHCb	pp at 7 TeV

¹ AAIJ 14H reports $[\Gamma(\Xi_b^0 \rightarrow pD^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma_{\text{total}}] / [B(\bar{b} \rightarrow b\text{-baryon})] / [B(\Lambda_b^0 \rightarrow pD^0 K^-)] = 0.44 \pm 0.09 \pm 0.06$ which we multiply by our best values $B(\bar{b} \rightarrow b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$, $B(\Lambda_b^0 \rightarrow pD^0 K^-) = (4.7 \pm 0.8) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(pK^0 \pi^- \times B(\bar{b} \rightarrow \Xi_b^-))/B(\bar{b} \rightarrow B^0)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.6 \times 10^{-6}$	90	AAIJ	14Q LHCb	pp at 7 TeV

$\Gamma(pK^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))/B(\bar{b} \rightarrow B^0)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 1.1 \times 10^{-6}$	90	AAIJ	14Q LHCb	pp at 7 TeV

$\Gamma(\Lambda_c^+ K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma(pD^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))$ Γ_6/Γ_3

VALUE	DOCUMENT ID	TECN	COMMENT
$0.35 \pm 0.19 \pm 0.02$	¹ AAIJ	14H LHCb	pp at 7 TeV

¹ AAIJ 14H reports $[\Gamma(\Xi_b^0 \rightarrow \Lambda_c^+ K^- \times B(\bar{b} \rightarrow \Xi_b^-))/\Gamma(\Xi_b^0 \rightarrow pD^0 K^- \times B(\bar{b} \rightarrow \Xi_b^-))] \times [B(\Lambda_c^+ \rightarrow pK^- \pi^+)] / [B(D^0 \rightarrow K^- \pi^+)] = 0.57 \pm 0.22 \pm 0.21$ which we multiply or divide by our best values $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (6.35 \pm 0.33) \times 10^{-2}$, $B(D^0 \rightarrow K^- \pi^+) = (3.93 \pm 0.04) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(\Lambda_b^0 \pi^- \times B(b \rightarrow \Xi_b^-))/B(b \rightarrow \Lambda_b^0)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$5.7 \pm 1.8_{-0.9}^{+0.8}$	¹ AAIJ	15BA LHCb	pp at 7, 8 TeV

¹ A signal is reported with a significance of 3.2 standard deviations in the decay chain of $\Xi_b^- \rightarrow \Lambda_b^0 \pi^-$, $\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-$, and $\Lambda_c^+ \rightarrow pK^- \pi^+$.

Ξ_b REFERENCES

AAIJ	15BA	PRL 115 241801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14AA	PRL 112 202001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14BJ	PRL 113 242002	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14H	PR D89 032001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14Q	JHEP 1404 087	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14T	PL B736 154	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14U	PL B734 122	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14Z	PRL 113 032001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	14B	PR D89 072014	T. Aaltonen <i>et al.</i>	(CDF 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.)
