NODE=S070

Ξ_b^0

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

NODE=S070

Ξ_b^0 MASS

NODE=S070205

Ξ_b^0 MASS

NODE=S070M0
NODE=S070M0

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
5791.7 ±0.4 OUR AVERAGE				
5791.12±0.60±0.51	[1] AAIJ	24V	LHCB	pp at 13 TeV
5794.3 ±2.4 ±0.7	AAIJ	14H	LHCB	pp at 7 TeV
5791.80±0.39±0.31	[2] AAIJ	14Z	LHCB	pp at 7, 8 TeV
5788.7 ±4.3 ±1.4	[3] AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5787.8 ±5.0 ±1.3	[4] AALTONEN	11X	CDF	Repl. by AALTONEN 14B

[1] Uses $\Xi_b^0 \to \Xi_c^+ D_s^-$ decays.

NODE=S070M0;LINKAGE=A

[2] Uses $\Xi_b^0 \to \Xi_c^+ \pi^-$ and $\Xi_c^+ \to p K^- \pi^+$ decays. The measurement comes from the mass difference of Ξ_b^0 and Λ_b^0.

NODE=S070M0;LINKAGE=AA

[3] Uses $\Xi_b^0 \to \Xi_c^+ \pi^-$ decays.

NODE=S070M0;LINKAGE=AL

[4] Measured in $\Xi_b^0 \to \Xi_c^+ \pi^-$ with $25.3^{+5.6}_{-5.4}$ candidates.

NODE=S070M0;LINKAGE=AT

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

NODE=S070DMN
NODE=S070DMN

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
172.3 ±0.4 OUR AVERAGE				
171.78±0.60±0.33	[1] AAIJ	24V	LHCB	pp at 13 TeV
174.8 ±2.4 ±0.5	AAIJ	14H	LHCB	pp at 7 TeV
172.44±0.39±0.17	[2] AAIJ	14Z	LHCB	pp at 7, 8 TeV

[1] Uses $\Xi_b^0 \to \Xi_c^+ D_s^-$ and $\Lambda_b^0 \to \Lambda_c^+ D_s^-$ decays.

NODE=S070DMN;LINKAGE=A

[2] Uses $\Xi_b^0 \to \Xi_c^+ \pi^-$ and $\Xi_c^+ \to p K^- \pi^+$ decays.

NODE=S070DMN;LINKAGE=AA

Ξ_b^0 MEAN LIFE

NODE=S070208

"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 (HFLAV) and are described at https://hflav.web.cern.ch/. The averaging/rescaling procedure takes into account correlations between the measurements and asymmetric lifetime errors.

NODE=S070208

Ξ_b^0 MEAN LIFE

NODE=S070T0
NODE=S070T0

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.477±0.032 OUR EVALUATION	(Produced by HFLAV)			→ UNCHECKED ←
1.477±0.026±0.019	[1] AAIJ	14Z	LHCB	pp at 7, 8 TeV

[1] Uses $\Xi_b^0 \to \Xi_c^+ \pi^-$ and $\Xi_c^+ \to p K^- \pi^+$ decays. The measurement comes from the value of relative lifetime of Ξ_b^0 to Λ_b^0.

NODE=S070T0;LINKAGE=AA

τ_{mix} (1/2π) times the $\Xi_b^0 - \overline{\Xi}_b^0$ oscillation period

NODE=S070TM0
NODE=S070TM0

VALUE (s)	DOCUMENT ID		TECN	COMMENT
$>13 \times 10^{-12}$	[1] AAIJ	17BH	LHCB	pp at 7, 8 TeV

[1] Uses Ξ_b^{*-} and $\Xi_b^{\prime -}$ decays to $\Xi_b^0 \pi^-$, where $\Xi_b^0 \to \Xi_c^+ \pi^-$, $\Xi_c^+ \to p K^- \pi^+$.

NODE=S070TM0;LINKAGE=A

Ξ_b^0 DECAY MODES

NODE=S070210;NODE=S070

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$pD^0K^-\times$ B($b\to\ \Xi_b^0$)	$(1.7\ \pm0.6\ )\times10^{-6}$		DESIG=3
Γ_2	$p\overline{K}^0\pi^-\times$ B($b\to\ \Xi_b^0$)/B($\overline{b}\to$ B^0)	$<1.6\times10^{-6}$	90%	DESIG=5
Γ_3	$pK^0K^-\times$ B($b\to\ \Xi_b^0$)/B($\overline{b}\to$ B^0)	$<1.1\times10^{-6}$	90%	DESIG=6
Γ_4	$\Lambda\pi^+\pi^-\times$ B($b\to\ \Xi_b^0$)/B($b\to$ Λ_b^0)	$<1.7\times10^{-6}$	90%	DESIG=8
Γ_5	$\Lambda K^-\pi^+\times$ B($b\to\ \Xi_b^0$)/B($b\to$ Λ_b^0)	$<8\times10^{-7}$	90%	DESIG=9
Γ_6	$\Lambda K^+K^-\times$ B($b\to\ \Xi_b^0$)/B($b\to$ Λ_b^0)	$<3\times10^{-7}$	90%	DESIG=10
Γ_7	$J/\psi\Lambda$	seen		DESIG=23;OUR EVAL;→ UNCHECKED ←
Γ_8	$J/\psi\Xi^0$	seen		DESIG=24;OUR EVAL;→ UNCHECKED ←
Γ_9	$\Xi_c^+D_s^-\times$ B($b\to\ \Xi_b^0$)/B($b\to\ \Lambda_b^0$)	$(1.7\ \pm0.9\ )\times10^{-3}$		DESIG=25
Γ_{10}	$\Lambda_c^+K^-\times$ B($b\to\ \Xi_b^0$)	$(6\ \ \pm4\ \ )\times10^{-7}$		DESIG=4
Γ_{11}	$pK^-\pi^+\pi^-\times$ B($b\to\ \Xi_b^0$)/B($b\to$ Λ_b^0)	$(1.9\ \pm0.4\ )\times10^{-6}$		DESIG=18
Γ_{12}	$pK^-K^-\pi^+\times$ B($b\to\ \Xi_b^0$)/B($b\to$ Λ_b^0)	$(1.73\pm0.31)\times10^{-6}$		DESIG=19
Γ_{13}	$pK^-K^+K^-\times$ B($b\to$ Ξ_b^0)/B($b\to\ \Lambda_b^0$)	$(1.8\ \pm1.0\ )\times10^{-7}$		DESIG=20

Ξ_b^0 BRANCHING RATIOS

NODE=S070215

$\Gamma(pD^0K^-\times$ B($b\to\ \Xi_b^0$) $)/\Gamma_{total}$ Γ_1/Γ

NODE=S070R01
NODE=S070R01

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
1.7±0.4±0.4	[1] AAIJ	14H	LHCB	pp at 7 TeV

[1] AAIJ 14H reports [$\Gamma(\Xi_b\to\ pD^0K^-\times$ B($\overline{b}\to\ \Xi_b$) $)/\Gamma_{total}$] / [B($\overline{b}\to$ b-baryon)] / [B($\Lambda_b^0\to\ pD^0K^-$)] $=0.44\pm0.09\pm0.06$ which we multiply by our best values B($\overline{b}\to$ b-baryon) $=(8.4\pm1.1)\times10^{-2}$, B($\Lambda_b^0\to\ pD^0K^-$) $=(4.6\pm0.8)\times10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=S070R01;LINKAGE=A

$\Gamma(p\overline{K}^0\pi^-\times$ B($b\to\ \Xi_b^0$)/B($\overline{b}\to\ B^0$)$)/\Gamma_{total}$ Γ_2/Γ

NODE=S070R03
NODE=S070R03

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.6\times10^{-6}$	90	AAIJ	14Q	LHCB	pp at 7 TeV

$\Gamma(pK^0K^-\times$ B($b\to\ \Xi_b^0$)/B($\overline{b}\to\ B^0$)$)/\Gamma_{total}$ Γ_3/Γ

NODE=S070R04
NODE=S070R04

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1\times10^{-6}$	90	AAIJ	14Q	LHCB	pp at 7 TeV

$\Gamma(\Lambda\pi^+\pi^-\times$ B($b\to\ \Xi_b^0$)/B($b\to\ \Lambda_b^0$)$)/\Gamma_{total}$ Γ_4/Γ

NODE=S070R00
NODE=S070R00

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7\times10^{-6}$	90	AAIJ	16W	LHCB	pp at 7, 8 TeV

$\Gamma(\Lambda K^-\pi^+\times$ B($b\to\ \Xi_b^0$)/B($b\to\ \Lambda_b^0$)$)/\Gamma_{total}$ Γ_5/Γ

NODE=S070R06
NODE=S070R06

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.8\times10^{-6}$	90	AAIJ	16W	LHCB	pp at 7, 8 TeV

$\Gamma(\Lambda K^+K^-\times$ B($b\to\ \Xi_b^0$)/B($b\to\ \Lambda_b^0$)$)/\Gamma_{total}$ Γ_6/Γ

NODE=S070R07
NODE=S070R07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<0.3\times10^{-6}$	90	AAIJ	16W	LHCB	pp at 7, 8 TeV

$\Gamma(J/\psi\Lambda)/\Gamma(J/\psi\Xi^0)$ Γ_7/Γ_8

NODE=S070R15
NODE=S070R15

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
8.2±2.1±0.9	[1] AAIJ	20U	LHCB	pp at 7, 8 and 13 TeV

[1] The Cabibbo suppressed $\Xi_b\to\ J/\psi\Lambda$ decay is observed for the first time.

NODE=S070R15;LINKAGE=A

$\Gamma(\Xi_c^+ D_s^- \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}$ Γ_9/Γ

NODE=S070R05
NODE=S070R05

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
1.7±0.9±0.2	[1] AAIJ	24V	LHCB	pp at 13 TeV

[1] AAIJ 24V reports $[\Gamma(\Xi_b^0 \to \Xi_c^+ D_s^- \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}] / [B(\Lambda_b^0 \to \Lambda_c^+ D_s^-)] = (15.8 \pm 1.1 \pm 7.7) \times 10^{-2}$ which we multiply by our best value $B(\Lambda_b^0 \to \Lambda_c^+ D_s^-) = (1.10 \pm 0.10) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=S070R05;LINKAGE=A

$\Gamma(\Lambda_c^+ K^- \times B(b \to \Xi_b^0))/\Gamma(p D^0 K^- \times B(b \to \Xi_b^0))$ Γ_{10}/Γ_1

NODE=S070R02
NODE=S070R02

VALUE	DOCUMENT ID		TECN	COMMENT
0.35±0.19±0.01	[1] AAIJ	14H	LHCB	pp at 7 TeV

[1] AAIJ 14H reports $[\Gamma(\Xi_b \to \Lambda_c^+ K^- \times B(\bar{b} \to \Xi_b)) / \Gamma(\Xi_b \to p D^0 K^- \times B(\bar{b} \to \Xi_b))] \times [B(\Lambda_c^+ \to p K^- \pi^+)] / [B(D^0 \to K^- \pi^+)] = 0.57 \pm 0.22 \pm 0.01$ which we multiply or divide by our best values $B(\Lambda_c^+ \to p K^- \pi^+) = (6.35 \pm 0.25) \times 10^{-2}$, $B(D^0 \to K^- \pi^+) = (3.945 \pm 0.030) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=S070R02;LINKAGE=A

$\Gamma(p K^- \pi^+ \pi^- \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}$ Γ_{11}/Γ

NODE=S070R12
NODE=S070R12

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
1.9±0.4±0.2	[1] AAIJ	18Q	LHCB	pp at 7, 8 TeV

[1] AAIJ 18Q reports $[\Gamma(\Xi_b \to p K^- \pi^+ \pi^- \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}] / [B(\Lambda_c^+ \to p K^- \pi^+)] / [B(\Lambda_b^0 \to \Lambda_c^+ \pi^-)] = (6.2 \pm 0.8 \pm 0.2 \pm 0.8) \times 10^{-3}$ which we multiply by our best values $B(\Lambda_c^+ \to p K^- \pi^+) = (6.35 \pm 0.25) \times 10^{-2}$, $B(\Lambda_b^0 \to \Lambda_c^+ \pi^-) = (4.9 \pm 0.4) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=S070R12;LINKAGE=A

$\Gamma(p K^- K^- \pi^+ \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}$ Γ_{12}/Γ

NODE=S070R13
NODE=S070R13

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
1.73±0.27±0.14	[1] AAIJ	18Q	LHCB	pp at 7, 8 TeV

[1] AAIJ 18Q reports $[\Gamma(\Xi_b \to p K^- K^- \pi^+ \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}] / [B(\Lambda_c^+ \to p K^- \pi^+)] / [B(\Lambda_b^0 \to \Lambda_c^+ \pi^-)] = (5.6 \pm 0.6 \pm 0.4 \pm 0.5) \times 10^{-3}$ which we multiply by our best values $B(\Lambda_c^+ \to p K^- \pi^+) = (6.35 \pm 0.25) \times 10^{-2}$, $B(\Lambda_b^0 \to \Lambda_c^+ \pi^-) = (4.9 \pm 0.4) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=S070R13;LINKAGE=A

$\Gamma(p K^- K^+ K^- \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}$ Γ_{13}/Γ

NODE=S070R14
NODE=S070R14

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
0.18±0.10±0.01	[1,2] AAIJ	18Q	LHCB	pp at 7, 8 TeV

[1] AAIJ 18Q reports $[\Gamma(\Xi_b \to p K^- K^+ K^- \times B(b \to \Xi_b^0)/B(b \to \Lambda_b^0))/\Gamma_{total}] / [B(\Lambda_c^+ \to p K^- \pi^+)] / [B(\Lambda_b^0 \to \Lambda_c^+ \pi^-)] = (0.57 \pm 0.28 \pm 0.08 \pm 0.10) \times 10^{-3}$ which we multiply by our best values $B(\Lambda_c^+ \to p K^- \pi^+) = (6.35 \pm 0.25) \times 10^{-2}$, $B(\Lambda_b^0 \to \Lambda_c^+ \pi^-) = (4.9 \pm 0.4) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

NODE=S070R14;LINKAGE=A

[2] AAIJ 18Q sees excess with a significance of 2.3σ. Using $B(\Lambda_b^0 \to \Lambda_c^+ \pi^-) = (0.430 \pm 0.036) \times 10^{-2}$ and $B(\Lambda_c^+ \to p K^- \pi^+) = (6.46 \pm 0.24) \times 10^{-2}$ the authors set two sided limit [0.11–0.25] at 90% C.L.

NODE=S070R14;LINKAGE=B

P AND *CP* VIOLATION ASYMMETRIES

NODE=S070230

$a_P(\Xi_b^0 \to p K^- K^- \pi^+)$

NODE=S070A01

Observable calculated as average of the triple products for Ξ_b^0 and $\bar{\Xi}_b^0$, which is sensitive to parity violation.

NODE=S070A01

VALUE (%)	DOCUMENT ID		TECN	COMMENT
−3.04±5.19±0.36	[1] AAIJ	18AG	LHCB	pp at 7, 8 TeV

NODE=S070A01

[1] Measured over full phase space of the decay.

NODE=S070A01;LINKAGE=A

$a_{CP}(\Xi_b^0 \to p K^- K^- \pi^+)$

NODE=S070A02

Observable calculated as half of the difference between triple products for Ξ_b^0 and $\overline{\Xi}_b^0$, which is sensitive to *CP* violation.

NODE=S070A02

VALUE (%)	*DOCUMENT ID*		*TECN*	*COMMENT*
−3.58±5.19±0.36	[1] AAIJ	18AG	LHCB	*pp* at 7, 8 TeV

NODE=S070A02

[1] Measured over full phase space of the decay.

NODE=S070A02;LINKAGE=A

$\Delta A_{CP}(\Xi_b^0 \to p K^- \pi^+ \pi^-)$

NODE=S070A04

$\Delta A_{CP} \equiv A_{CP}(\Xi_b^0 \to p K^- \pi^+ \pi^-) - A_{CP}(\Xi_b^0 \to (\Xi_c^+ \to p K^- \pi^+)\pi^-)$

NODE=S070A04

VALUE (units 10^{-2})	*DOCUMENT ID*		*TECN*	*COMMENT*
−17±11±1	[1] AAIJ	19AH	LHCB	*pp* at 7 and 8 TeV

NODE=S070A04

[1] Full phase space.

NODE=S070A04;LINKAGE=A

$\Delta A_{CP}(\Xi_b^0 \to p K^- \pi^+ K^-)$

NODE=S070A05

$\Delta A_{CP} \equiv A_{CP}(\Xi_b^0 \to p K^- \pi^+ K^-) - A_{CP}(\Xi_b^0 \to (\Xi_c^+ \to p K^- \pi^+)\pi^-)$

NODE=S070A05

VALUE (units 10^{-2})	*DOCUMENT ID*		*TECN*	*COMMENT*
−6.8±8.0±0.8	[1] AAIJ	19AH	LHCB	*pp* at 7 and 8 TeV

NODE=S070A05

[1] Full phase space.

NODE=S070A05;LINKAGE=A

Ξ_b^0 REFERENCES

NODE=S070

AAIJ	24V	EPJ C84 237	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	20U	PRL 124 111802	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	19AH	EPJ C79 745	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18AG	JHEP 1808 039	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	18Q	JHEP 1802 098	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17BH	PRL 119 181807	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16W	JHEP 1605 081	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14H	PR D89 032001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14Q	JHEP 1404 087	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14Z	PRL 113 032001	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14B	PR D89 072014	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	11X	PRL 107 102001	T. Aaltonen *et al.*	(CDF Collab.)

REFID=62886
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