



$I(J^P) = 0(\frac{1}{2}^+)$  Status: \*\*\*  
 $I, J, P$  need confirmation.

In the quark model  $\Omega_b^-$  is  $ssb$  ground state. None of its quantum numbers has been measured.

## $\Omega_b^-$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>6045.2 ± 1.2 OUR AVERAGE</b>			
6044.30 ± 1.20 ± 1.12	<sup>1</sup> AAIJ	21AC LHCb	$pp$ at 7, 8, 13 TeV
6045.1 ± 3.2 ± 0.8	<sup>2</sup> AAIJ	16O LHCb	$pp$ at 7, 8 TeV
6047.5 ± 3.8 ± 0.6	<sup>3</sup> AALTONEN	14B CDF	$p\bar{p}$ at 1.96 TeV
6046.0 ± 2.2 ± 0.5	<sup>4</sup> AAIJ	13AV LHCb	$pp$ at 7 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
6054.4 ± 6.8 ± 0.9	<sup>5</sup> AALTONEN	09AP CDF	Repl. by AALTONEN 14B
6165 ± 10 ± 13	<sup>6</sup> ABAZOV	08AL D0	$p\bar{p}$ at 1.96 TeV

<sup>1</sup> Uses  $\Omega_b^- \rightarrow \Xi_c^+ K^- \pi^-$  and  $\Xi_c^+ \rightarrow p K^- \pi^+$  decays. Reports the value of  $6044.3 \pm 1.2 \pm 1.1^{+0.19}_{-0.22}$  MeV where the last uncertainty is due to the mass of  $\Xi_c^+$ . We have combined the two systematic uncertainties in quadrature.

<sup>2</sup> Reconstructed in  $\Omega_b^- \rightarrow \Omega_c^0 \pi^-$ ,  $\Omega_c^0 \rightarrow p K^- K^- \pi^+$  decays. Reference  $\Xi_b^-$  mass  $5797.72 \pm 0.6$  MeV from AAIJ 14B.

<sup>3</sup> Uses  $\Omega_b^- \rightarrow J/\psi \Omega^-$  and  $\Omega_c^0 \pi^-$  decays, with the first evidence for  $\Omega_b^- \rightarrow \Omega_c^0 \pi^-$  at 3.3  $\sigma$  significance.

<sup>4</sup> Measured in  $\Omega_b^- \rightarrow J/\psi \Omega^-$  with  $19 \pm 5$  events.

<sup>5</sup> Observed in  $\Omega_b^- \rightarrow J/\psi \Omega^-$  decays with  $16^{+6}_{-4}$  candidates, a significance of 5.5 sigma from a combined mass-lifetime fit.

<sup>6</sup> Observed in  $\Omega_b^- \rightarrow J/\psi \Omega^-$  decays with  $17.8 \pm 4.9 \pm 0.8$  candidates, a significance of 5.4 sigma.

### $m_{\Omega_b^-} - m_{\Lambda_b^0}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>426.4 ± 2.2 ± 0.4</b>	AAIJ	13AV LHCb	$pp$ at 7 TeV

### $m_{\Omega_b^-} - m_{\Xi_b^-}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>247.3 ± 3.2 ± 0.5</b>	<sup>1</sup> AAIJ	16O LHCb	$pp$ at 7, 8 TeV

<sup>1</sup> Uses  $\Omega_b^- \rightarrow \Omega_c^0 \pi^-$ ,  $\Omega_c^0 \rightarrow p K^- K^- \pi^+$  and  $\Xi_b^- \rightarrow \Xi_c^0 \pi^-$ ,  $\Xi_c^0 \rightarrow p K^- K^- \pi^+$  decays.

## $\Omega_b^-$ MEAN LIFE

"OUR EVALUATION" has been provided by the Heavy Flavor Averaging Group (HFLAV, <https://hflav.web.cern.ch/>).

VALUE ( $10^{-12}$ s)	DOCUMENT ID	TECN	COMMENT
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**1.64<sup>+0.18</sup><sub>-0.17</sub> OUR EVALUATION****1.65<sup>+0.18</sup><sub>-0.16</sub> OUR AVERAGE**1.78 ± 0.26 ± 0.05 ± 0.06      <sup>1</sup> AAIJ      16O LHCb    $p\bar{p}$  at 7, 8 TeV1.54<sup>+0.26</sup><sub>-0.21</sub> ± 0.05      <sup>2</sup> AAIJ      14T LHCb    $p\bar{p}$  at 7, 8 TeV1.66<sup>+0.53</sup><sub>-0.40</sub> ± 0.02      <sup>2</sup> AALTONEN   14B CDF    $p\bar{p}$  at 1.96 TeV

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

1.13<sup>+0.53</sup><sub>-0.40</sub> ± 0.02      <sup>3</sup> AALTONEN   09AP CDF   Repl. by AALTONEN 14B<sup>1</sup> Measured in  $\Omega_b^- \rightarrow \Omega_c^0 \pi^-, \Omega_c^0 \rightarrow p K^- K^- \pi^+$  decays relative to  $\Xi_b^- \rightarrow \Xi_c^0 \pi^-, \Xi_c^0 \rightarrow p K^- K^- \pi^+$  decays with reference  $\Xi_b^-$  mean life  $1.599 \pm 0.06$  ps from AAIJ 14B.<sup>2</sup> Measured in  $\Omega_b^- \rightarrow J/\psi \Omega^-$  decays.<sup>3</sup> Observed in  $\Omega_b^- \rightarrow J/\psi \Omega^-$  decays with  $16^{+6}_{-4}$  candidates, a significance of 5.5 sigma from a combined mass-lifetime fit. **$\tau(\Omega_b^-)/\tau(\Xi_b^-)$  mean life ratio**

VALUE	DOCUMENT ID	TECN	COMMENT
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**1.11 ± 0.16 ± 0.03**      <sup>1</sup> AAIJ      16O LHCb    $p\bar{p}$  at 7, 8 TeV<sup>1</sup> Uses  $\Omega_b^- \rightarrow \Omega_c^0 \pi^-, \Omega_c^0 \rightarrow p K^- K^- \pi^+$  and  $\Xi_b^- \rightarrow \Xi_c^0 \pi^-, \Xi_c^0 \rightarrow p K^- K^- \pi^+$  decays. **$\Omega_b^-$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $J/\psi \Omega^- \times B(b \rightarrow \Omega_b)$	$(2.9^{+1.1}_{-0.8}) \times 10^{-6}$	
$\Gamma_2$ $p K^- K^- \times B(\bar{b} \rightarrow \Omega_b)$	$< 2.3 \times 10^{-9}$	90%
$\Gamma_3$ $p \pi^- \pi^- \times B(\bar{b} \rightarrow \Omega_b)$	$< 1.5 \times 10^{-8}$	90%
$\Gamma_4$ $p K^- \pi^- \times B(\bar{b} \rightarrow \Omega_b)$	$< 7 \times 10^{-9}$	90%
$\Gamma_5$ $\Omega_c^0 \pi^-$	seen	
$\Gamma_6$ $\Omega_c^0 \pi^-, \Omega_c^0 \rightarrow p K^- K^- \pi^+$	seen	
$\Gamma_7$ $\Xi_c^+ K^- \pi^-$	seen	

 **$\Omega_b^-$  BRANCHING RATIOS** **$\Gamma(J/\psi \Omega^- \times B(b \rightarrow \Omega_b))/\Gamma_{\text{total}}$        $\Gamma_1/\Gamma$** 

VALUE (units $10^{-4}$ )	DOCUMENT ID	TECN	COMMENT
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**0.029<sup>+0.011</sup><sub>-0.008</sub> OUR AVERAGE**0.026<sup>+0.010</sup><sub>-0.007</sub> ± 0.004      <sup>1</sup> AALTONEN   09AP CDF    $p\bar{p}$  at 1.96 TeV0.08 ± 0.04 ± 0.02      <sup>2</sup> ABAZOV      08AL D0    $p\bar{p}$  at 1.96 TeV

<sup>1</sup> AALTONEN 09AP reports  $[\Gamma(\Omega_b^- \rightarrow J/\psi \Omega^- \times B(b \rightarrow \Omega_b)) / \Gamma_{\text{total}}] / [B(\Lambda_b^0 \rightarrow J/\psi(1S) \Lambda \times B(b \rightarrow \Lambda_b^0))] = 0.045_{-0.012}^{+0.017} \pm 0.004$  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.

<sup>2</sup> ABAZOV 08AL reports  $[\Gamma(\Omega_b^- \rightarrow J/\psi \Omega^- \times B(b \rightarrow \Omega_b)) / \Gamma_{\text{total}}] / [B(\Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-))] = 0.80 \pm 0.32_{-0.22}^{+0.14}$  which we multiply by our best value  $B(\Xi_b^- \rightarrow J/\psi \Xi^- \times B(b \rightarrow \Xi_b^-)) = (1.02_{-0.21}^{+0.26}) \times 10^{-5}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

### $\Gamma(pK^-K^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}} \quad \Gamma_2/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;2.3 × 10<sup>-4</sup></b>	90	<sup>1</sup> AAIJ	21AH LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2.5 × 10 <sup>-4</sup>	90	<sup>2</sup> AAIJ	17F LHCB	pp at 7, 8 TeV

<sup>1</sup> AAIJ 21AH reports  $[\Gamma(\Omega_b^- \rightarrow pK^-K^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}}] / [B(\Xi_b^- \rightarrow pK^-K^- \times B(b \rightarrow \Xi_b^-))] < 62 \times 10^{-3}$  which we multiply by our best value  $B(\Xi_b^- \rightarrow pK^-K^- \times B(b \rightarrow \Xi_b^-)) = 3.7 \times 10^{-8}$ .

<sup>2</sup> AAIJ 17F reports  $[\Gamma(\Omega_b^- \rightarrow pK^-K^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}}] / [B(B^+ \rightarrow K^+K^-K^+)] / [B(\bar{b} \rightarrow B^+)] < 18 \times 10^{-5}$  which we multiply by our best values  $B(B^+ \rightarrow K^+K^-K^+) = 3.40 \times 10^{-5}$ ,  $B(\bar{b} \rightarrow B^+) = 40.8 \times 10^{-2}$ .

### $\Gamma(p\pi^-\pi^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}} \quad \Gamma_3/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;1.5 × 10<sup>-3</sup></b>	90	<sup>1</sup> AAIJ	17F LHCB	pp at 7, 8 TeV

<sup>1</sup> AAIJ 17F reports  $[\Gamma(\Omega_b^- \rightarrow p\pi^-\pi^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}}] / [B(B^+ \rightarrow K^+K^-K^+) / [B(\bar{b} \rightarrow B^+)]] < 109 \times 10^{-5}$  which we multiply by our best values  $B(B^+ \rightarrow K^+K^-K^+) = 3.40 \times 10^{-5}$ ,  $B(\bar{b} \rightarrow B^+) = 40.8 \times 10^{-2}$ .

### $\Gamma(pK^-\pi^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}} \quad \Gamma_4/\Gamma$

VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;7 × 10<sup>-4</sup></b>	90	<sup>1</sup> AAIJ	17F LHCB	pp at 7, 8 TeV

<sup>1</sup> AAIJ 17F reports  $[\Gamma(\Omega_b^- \rightarrow pK^-\pi^- \times B(\bar{b} \rightarrow \Omega_b)) / \Gamma_{\text{total}}] / [B(B^+ \rightarrow K^+K^-K^+) / [B(\bar{b} \rightarrow B^+)]] < 51 \times 10^{-5}$  which we multiply by our best values  $B(B^+ \rightarrow K^+K^-K^+) = 3.40 \times 10^{-5}$ ,  $B(\bar{b} \rightarrow B^+) = 40.8 \times 10^{-2}$ .

### $\Gamma(\Omega_c^0 \pi^-) / \Gamma_{\text{total}} \quad \Gamma_5/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	AAIJ	160 LHCB	pp at 7, 8 TeV

### $\Gamma(\Xi_c^+ K^- \pi^-) / \Gamma(\Omega_c^0 \pi^-, \Omega_c^0 \rightarrow pK^-K^- \pi^+) \quad \Gamma_7/\Gamma_6$

VALUE (units $10^2$ )	DOCUMENT ID	TECN	COMMENT
<b>2.2 ± 0.2 ± 1.0</b>	<sup>1</sup> AAIJ	21AC LHCB	pp at 7, 8, 13 TeV

<sup>1</sup> AAIJ 21AC reports  $[\Gamma(\Omega_b^- \rightarrow \Xi_c^+ K^- \pi^-) / \Gamma(\Omega_b^- \rightarrow \Omega_c^0 \pi^-, \Omega_c^0 \rightarrow p K^- K^- \pi^+)] \times [B(\Xi_c^+ \rightarrow p K^- \pi^+)] = 1.35 \pm 0.11 \pm 0.05$  which we divide by our best value  $B(\Xi_c^+ \rightarrow p K^- \pi^+) = (6.2 \pm 3.0) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value.

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## $\Omega_b^-$ REFERENCES

AAIJ	21AC	PR D104 L091102	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	21AH	PR D104 052010	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	17F	PRL 118 071801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	16O	PR D93 092007	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14B	PL B728 234	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14T	PL B736 154	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	09AP	PR D80 072003	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	08AL	PRL 101 232002	V.M. Abazov <i>et al.</i>	(D0 Collab.)

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