Ω_b^-

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

In the quark model Ω_b^- is *ssb* ground state. None of its quantum numbers has been measured.

Ω_b^- MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
6045.8 ± 0.8 OUR AVERAGE				
6045.7 ± 0.5 ± 0.6	[1] AAIJ	23BD	LHCB	pp at 7, 8, 13 TeV
6047.5 ± 3.8 ± 0.6	[2] AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6045.9 ± 0.5 ± 0.6	[3] AAIJ	23BD	LHCB	pp at 7, 8, 13 TeV
6044.30± 1.20± 1.12	[4] AAIJ	21AC	LHCB	Repl. by AAIJ 23BD
6045.1 ± 3.2 ± 0.8	[5] AAIJ	16O	LHCB	Repl. by AAIJ 23BD
6046.0 ± 2.2 ± 0.5	[6] AAIJ	13AV	LHCB	Repl. by AAIJ 23BD
6054.4 ± 6.8 ± 0.9	[7] AALTONEN	09AP	CDF	Repl. by AALTONEN 14B
6165 ±10 ±13	[8] ABAZOV	08AL	D0	$p\overline{p}$ at 1.96 TeV

[1] Combines measurement using $\Omega_b^- \to J/\psi\Omega^-$ decays with results from AAIJ 16O and AAIJ 21AC taking into account correlations amongst systematic uncertainties. Uses Ξ_b^- mass 5797.33 ± 0.24 ± 029 MeV from AAIJ 21.

[2] Uses $\Omega_b^- \to J/\psi\Omega^-$ and $\Omega_c^0\pi^-$ decays, with the first evidence for $\Omega_b^- \to \Omega_c^0\pi^-$ at 3.3 σ significance.

[3] Uses $\Omega_b^- \to J/\psi\Omega^-$ decays.

[4] Uses $\Omega_b^- \to \Xi_c^+ K^-\pi^-$ and $\Xi_c^+ \to pK^-\pi^+$ decays. Reports the value of 6044.3 ± 1.2 ± $1.1^{+0.19}_{-0.22}$ MeV where the last uncertainty is due to the mass of Ξ_c^+. We have combined the two systematic uncertainties in quadrature.

[5] Reconstructed in $\Omega_b^- \to \Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$ decays. Reference Ξ_b^- mass 5797.72 ± 0.6 MeV from AAIJ 14B.

[6] Measured in $\Omega_b^- \to J/\psi\Omega^-$ with 19 ± 5 events.

[7] Observed in $\Omega_b^- \to J/\psi\Omega^-$ decays with 16^{+6}_{-4} candidates, a significance of 5.5 sigma from a combined mass-lifetime fit.

[8] Observed in $\Omega_b^- \to J/\psi\Omega^-$ decays with 17.8 ± 4.9 ± 0.8 candidates, a significance of 5.4 sigma.

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

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
426.4±2.2±0.4	AAIJ	13AV	LHCB	pp at 7 TeV

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

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
248.50±0.51±0.37	[1] AAIJ	23BD	LHCB	pp at 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
248.54±0.51±0.38	[2] AAIJ	23BD	LHCB	pp at 7, 8, 13 TeV
247.3 ±3.2 ±0.5	[3] AAIJ	16O	LHCB	Repl. by AAIJ 23BD

[1] Uses $\Omega_b^- \to J/\psi\Omega$ decays combined with the result from AAIJ 16O obtained using $\Omega_b^- \to \Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$ and $\Xi_b^- \to \Xi_c^0\pi^-$, $\Xi_c^0 \to pK^-K^-\pi^+$ decays taking into account correlation of systematic uncertainties.

[2] Uses $\Omega_b^- \to J/\psi\Omega$ decays.

[3] Uses $\Omega_b^- \to \Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$ and $\Xi_b^- \to \Xi_c^0\pi^-$, $\Xi_c^0 \to pK^-K^-\pi^+$ decays.

Ω_b MEAN LIFE

VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.64±0.16 OUR EVALUATION	(Produced by HFLAV)			
$1.65^{+0.18}_{-0.16}$ OUR AVERAGE				
$1.78\pm0.26\pm0.05\pm0.06$	[1] AAIJ	16O	LHCB	pp at 7, 8 TeV
$1.54^{+0.26}_{-0.21}\pm0.05$	[2] AAIJ	14T	LHCB	pp at 7, 8 TeV
$1.66^{+0.53}_{-0.40}\pm0.02$	[2] AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$1.13^{+0.53}_{-0.40}\pm0.02$	[3] AALTONEN	09AP	CDF	Repl. by AALTONEN 14B

[1] Measured in $\Omega_b^- \to \Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$ decays relative to $\Xi_b^- \to \Xi_c^0\pi^-$, $\Xi_c^0 \to pK^-K^-\pi^+$ decays with reference Ξ_b^- mean life 1.599 ± 0.06 ps from AAIJ 14B.

[2] Measured in $\Omega_b^- \to J/\psi\Omega^-$ decays.

[3] Observed in $\Omega_b^- \to J/\psi\Omega^-$ 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
1.11±0.16±0.03	[1] AAIJ	16O	LHCB	pp at 7, 8 TeV

[1] Uses $\Omega_b^- \to \Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$ and $\Xi_b^- \to \Xi_c^0\pi^-$, $\Xi_c^0 \to pK^-K^-\pi^+$ decays.

Ω_b^- DECAY MODES

	Mode	Fraction (Γ_i/Γ)		Scale factor/ Confidence level
Γ_1	$J/\psi\Omega^-\times$B($b \to \Omega_b$)	$(1.4^{+0.5}_{-0.4})\times10^{-6}$		S=1.6
Γ_2	$pK^-K^-\times$B($\overline{b} \to \Omega_b$)	< 2.3	$\times10^{-9}$	CL=90%
Γ_3	$p\pi^-\pi^-\times$B($\overline{b} \to \Omega_b$)	< 1.5	$\times10^{-8}$	CL=90%
Γ_4	$pK^-\pi^-\times$B($\overline{b} \to \Omega_b$)	< 7	$\times10^{-9}$	CL=90%
Γ_5	$\Omega_c^0\pi^-$	seen		
Γ_6	$\Omega_c^0\pi^-$, $\Omega_c^0 \to pK^-K^-\pi^+$	seen		
Γ_7	$\Xi_c^+K^-\pi^-$	seen		
Γ_8	$\Lambda_c^+K^-K^-$			

Γ_9 $\Lambda_c^+ K^- \pi^-$
Γ_{10} $\Lambda_c^+ \pi^- \pi^-$

Ω_b^- BRANCHING RATIOS

$\Gamma\left(J/\psi\Omega^- \times B(b \to \Omega_b)\right)/\Gamma_{total}$ Γ_1/Γ

VALUE (units 10^{-6})	DOCUMENT ID	TECN	COMMENT
1.4 $^{+0.5}_{-0.4}$ OUR AVERAGE Error includes scale factor of 1.6.			
$1.22 \pm 0.12 ^{+0.31}_{-0.26}$	[1,2] AAIJ	23BD LHCB	pp at 13 TeV
$2.6 \ ^{+1.0}_{-0.7} \pm 0.4$	[3] AALTONEN	09AP CDF	$p\overline{p}$ at 1.96 TeV
$8 \pm 4 \pm 2$	[4] ABAZOV	08AL D0	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 23BD reports $[\Gamma(\Omega_b^- \to J/\psi\Omega^- \times B(b \to \Omega_b))/\Gamma_{total}] / [B(\Xi_b^- \to J/\psi\Xi^- \times B(b \to \Xi_b^-))] = 0.120 \pm 0.008 \pm 0.008$ which we multiply by our best value $B(\Xi_b^- \to J/\psi\Xi^- \times B(b \to \Xi_b^-)) = (1.02^{+0.26}_{-0.21}) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Reconstructing beauty baryons in the kinematic region $2 < \eta < 6$ and $p_T < 20$ GeV/c with their decays to a J/ψ meson and a hyperon.

[3] AALTONEN 09AP reports $[\Gamma(\Omega_b^- \to J/\psi\Omega^- \times B(b \to \Omega_b))/\Gamma_{total}] / [B(\Lambda_b^0 \to J/\psi(1S)\Lambda \times B(b \to \Lambda_b^0))] = 0.045^{+0.017}_{-0.012} \pm 0.004$ which we multiply by our best value $B(\Lambda_b^0 \to J/\psi(1S)\Lambda \times B(b \to \Lambda_b^0)) = (5.8 \pm 0.8) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

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

$\Gamma\left(pK^-K^- \times B(\overline{b} \to \Omega_b)\right)/\Gamma_{total}$ Γ_2/Γ

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

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

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

$\Gamma(p\pi^-\pi^-\times B(\overline{b}\to\Omega_b))/\Gamma_{total}$ Γ_3/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$<1.5\times10^{-3}$	90	[1] AAIJ	17F	LHCB	pp at 7, 8 TeV

[1] AAIJ 17F reports $[\Gamma(\Omega_b^-\to p\pi^-\pi^-\times B(\overline{b}\to\Omega_b))/\Gamma_{total}]$ / $[B(B^+\to K^+K^-K^+)]$ / $[B(\overline{b}\to B^+)] < 109\times10^{-5}$ which we multiply by our best values $B(B^+\to K^+K^-K^+) = 3.40\times10^{-5}$, $B(\overline{b}\to B^+) = 40.8\times10^{-2}$.

$\Gamma(pK^-\pi^-\times B(\overline{b}\to\Omega_b))/\Gamma_{total}$ Γ_4/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
$<7\times10^{-4}$	90	[1] AAIJ	17F	LHCB	pp at 7, 8 TeV

[1] AAIJ 17F reports $[\Gamma(\Omega_b^-\to pK^-\pi^-\times B(\overline{b}\to\Omega_b))/\Gamma_{total}]$ / $[B(B^+\to K^+K^-K^+)]$ / $[B(\overline{b}\to B^+)] < 51\times10^{-5}$ which we multiply by our best values $B(B^+\to K^+K^-K^+) = 3.40\times10^{-5}$, $B(\overline{b}\to B^+) = 40.8\times10^{-2}$.

$\Gamma(\Omega_c^0\pi^-)/\Gamma_{total}$ Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	AAIJ	16O	LHCB	pp at 7, 8 TeV

$\Gamma(\Xi_c^+K^-\pi^-)/\Gamma(\Omega_c^0\pi^-,\ \Omega_c^0\to pK^-K^-\pi^+)$ Γ_7/Γ_6

VALUE (units 10^2)	DOCUMENT ID		TECN	COMMENT
$2.2\pm0.2\pm1.0$	[1] AAIJ	21AC	LHCB	pp at 7, 8, 13 TeV

[1] AAIJ 21AC reports $[\Gamma(\Omega_b^-\to\Xi_c^+K^-\pi^-)/\Gamma(\Omega_b^-\to\Omega_c^0\pi^-,\ \Omega_c^0\to pK^-K^-\pi^+)]$ $\times$ $[B(\Xi_c^+\to pK^-\pi^+)] = 1.35\pm0.11\pm0.05$ which we divide by our best value $B(\Xi_c^+\to pK^-\pi^+) = (6.2\pm3.0)\times10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda_c^+K^-\pi^-)/\Gamma(\Lambda_c^+K^-K^-)$ Γ_9/Γ_8

VALUE	DOCUMENT ID		TECN	COMMENT
<0.56	AAIJ	24T	LHCB	pp at 7, 8, 13 TeV

$\Gamma(\Lambda_c^+\pi^-\pi^-)/\Gamma(\Lambda_c^+K^-K^-)$ Γ_{10}/Γ_8

VALUE	DOCUMENT ID		TECN	COMMENT
<0.37	AAIJ	24T	LHCB	pp at 7, 8, 13 TeV

Ω_b^- REFERENCES

AAIJ	24T	JHEP 2408 132	R. Aaij	(LHCb Collab.)
AAIJ	23BD	PR D108 052008	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21	PR D103 012004	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21AC	PR D104 L091102	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	21AH	PR D104 052010	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	17F	PRL 118 071801	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	16O	PR D93 092007	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14B	PL B728 234	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14T	PL B736 154	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14B	PR D89 072014	T. Aaltonen *et al.*	(CDF Collab.)
AAIJ	13AV	PRL 110 182001	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	09AP	PR D80 072003	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	08AL	PRL 101 232002	V.M. Abazov *et al.*	(D0 Collab.)