Λ_b^0

$I(J^P) = 0(\frac{1}{2}^+)$ Status: ∗∗∗

In the quark model, a Λ_b^0 is an isospin-0 $u d b$ state. The lowest Λ_b^0 ought to have $J^P = 1/2^+$. None of I, J, or P have actually been measured.

Λ_b^0 MASS

$m_{\Lambda_b^0}$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
5619.51±0.23 OUR AVERAGE					
5619.30±0.34		[1] AAIJ	14AA	LHCB	pp at 7 TeV
5620.15±0.31±0.47		[2] AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
5619.7±0.7±1.1		[2] AAD	13U	ATLS	pp at 7 TeV
5619.44±0.13±0.38		[2] AAIJ	13AV	LHCB	pp at 7 TeV
5621±4±3		[3] ABE	97B	CDF	$p\overline{p}$ at 1.8 TeV
5668±16±8	4	[4] ABREU	96N	DLPH	$e^+e^- \rightarrow Z$
5614±21±4	4	[4] BUSKULIC	96L	ALEP	$e^+e^- \rightarrow Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
5619.19±0.70±0.30		[2] AAIJ	12E	LHCB	Repl. by AAIJ 13AV
5619.7±1.2±1.2		[5] ACOSTA	06	CDF	Repl. by AALTONEN 14B
not seen		[6] ABE	93B	CDF	Repl. by ABE 97B
5640±50±30	16	[7] ALBAJAR	91E	UA1	$p\overline{p}$ 630 GeV
5640 $^{+100}_{-210}$	52	BARI	91	SFM	$\Lambda_b^0 \rightarrow pD^0\pi^-$
5650 $^{+150}_{-200}$	90	BARI	91	SFM	$\Lambda_b^0 \rightarrow \Lambda_c^+\pi^+\pi^-\pi^-$

[1] Uses exclusively reconstructed final states $\Lambda_b^0 \rightarrow \Lambda_c^+ D_s^-$, $\Lambda_c^+ D^-$ and $\overline{B}^0 \rightarrow D^+ D_s^-$ decays. The uncertainty includes both statistical and systematic contributions.

[2] Uses $\Lambda_b^0 \rightarrow J/\psi\Lambda$ fully reconstructed decays.

[3] ABE 97B observed 38 events with a background of 18 ± 1.6 events in the mass range 5.60–5.65 GeV/c^2, a significance of > 3.4 standard deviations.

[4] Uses 4 fully reconstructed Λ_b events.

[5] Uses exclusively reconstructed final states containing a $J/\psi \rightarrow \mu^+\mu^-$ decays.

[6] ABE 93B states that, based on the signal claimed by ALBAJAR 91E, CDF should have found 30 ± 23 $\Lambda_b^0 \rightarrow J/\psi(1S)\Lambda$ events. Instead, CDF found not more than 2 events.

[7] ALBAJAR 91E claims 16 ± 5 events above a background of 9 ± 1 events, a significance of about 5 standard deviations.

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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
339.2±1.4±0.1	[1] ACOSTA	06	CDF	$p\overline{p}$ at 1.96 TeV

[1] Uses exclusively reconstructed final states containing $J/\psi \rightarrow \mu^+\mu^-$ decays.

$m_{\Lambda_b^0} - m_{B^+}$

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
339.72±0.28 OUR AVERAGE					
339.72±0.24±0.18	[1]	AAIJ	14AA	LHCB	pp at 7 TeV
339.71±0.71±0.09	[2]	AAIJ	12E	LHCB	pp at 7 TeV

[1] Uses exclusively reconstructed final states $\Lambda_b^0 \to \Lambda_c^+ D_s^-$, $\Lambda_c^+ D^-$ and $\overline{B}^0 \to D^+ D_s^-$ decays.
[2] Uses exclusively reconstructed final states containing $J/\psi \to \mu^+ \mu^-$ decays.

Λ_b^0 MEAN LIFE

See b-baryon Admixture section for data on b-baryon mean life average over species of b-baryon particles.

"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
1.466±0.010 OUR EVALUATION						
1.415±0.027±0.006		[1]	AAIJ	14E	LHCB	pp at 7 TeV
1.479±0.009±0.010		[2]	AAIJ	14U	LHCB	pp at 7, 8 TeV
1.565±0.035±0.020		[1]	AALTONEN	14B	CDF	$p\overline{p}$ at 1.96 TeV
1.449±0.036±0.017		[1]	AAD	13U	ATLS	pp at 7 TeV
1.503±0.052±0.031		[1]	CHATRCHYAN	13AC	CMS	pp at 7 TeV
1.303±0.075±0.035		[1]	ABAZOV	12U	D0	$p\overline{p}$ at 1.96 TeV
1.401±0.046±0.035		[3]	AALTONEN	10B	CDF	$p\overline{p}$ at 1.96 TeV
$1.290^{+0.119}_{-0.110}{}^{+0.087}_{-0.091}$		[4]	ABAZOV	07U	D0	$p\overline{p}$ at 1.96 TeV
$1.11^{+0.19}_{-0.18}\pm0.05$		[5]	ABREU	99W	DLPH	$e^+e^- \to Z$
$1.29^{+0.24}_{-0.22}\pm0.06$		[5]	ACKERSTAFF	98G	OPAL	$e^+e^- \to Z$
1.21 ±0.11		[5]	BARATE	98D	ALEP	$e^+e^- \to Z$
1.32 ±0.15 ±0.07		[6]	ABE	96M	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.482±0.018±0.012		[7]	AAIJ	13BB	LHCB	Repl. by AAIJ 14U
1.537±0.045±0.014		[1]	AALTONEN	11	CDF	Repl. by AALTONEN 14B
$1.218^{+0.130}_{-0.115}\pm0.042$		[1]	ABAZOV	07S	D0	Repl. by ABAZOV 12U
$1.593^{+0.083}_{-0.078}\pm0.033$		[1]	ABULENCIA	07A	CDF	Repl. by AALTONEN 11
$1.22^{+0.22}_{-0.18}\pm0.04$		[1]	ABAZOV	05C	D0	Repl. by ABAZOV 07S
$1.19^{+0.21}_{-0.18}{}^{+0.07}_{-0.08}$			ABREU	96D	DLPH	Repl. by ABREU 99W
$1.14^{+0.22}_{-0.19}\pm0.07$	69		AKERS	95K	OPAL	Repl. by ACKERSTAFF 98G
$1.02^{+0.23}_{-0.18}\pm0.06$	44		BUSKULIC	95L	ALEP	Repl. by BARATE 98D

[1] Measured mean life using fully reconstructed $\Lambda_b^0 \rightarrow J/\psi \Lambda$ decays.
[2] Used $\Lambda_b^0 \rightarrow J/\psi p K^-$ decays.
[3] Measured mean life using fully reconstructed $\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-$ decays.
[4] Measured using semileptonic decays $\Lambda_b^0 \rightarrow \Lambda_c^+ \mu \nu X$ and $\Lambda_c^+ \rightarrow K_S^0 p$.
[5] Measured using $\Lambda_c \ell^-$ and $\Lambda \ell^+ \ell^-$.
[6] Excess $\Lambda_c \ell^-$, decay lengths.
[7] Measured the lifetime ratio of decays $\Lambda_b^0 \rightarrow J/\psi p K^-$ to $B^0 \rightarrow J/\psi \pi^+ K^-$ to be $0.976 \pm 0.012 \pm 0.006$ with $\tau_{B^0} = 1.519 \pm 0.007$ ps.

$\tau_{\Lambda_b^0}/\tau_{\overline{\Lambda}_b^0}$

VALUE	DOCUMENT ID		TECN	COMMENT
0.940±0.035±0.006	[1] AAIJ	14E	LHCB	pp at 7 TeV

[1] Measured using $\Lambda_b^0 \rightarrow J/\psi \Lambda$ decays.

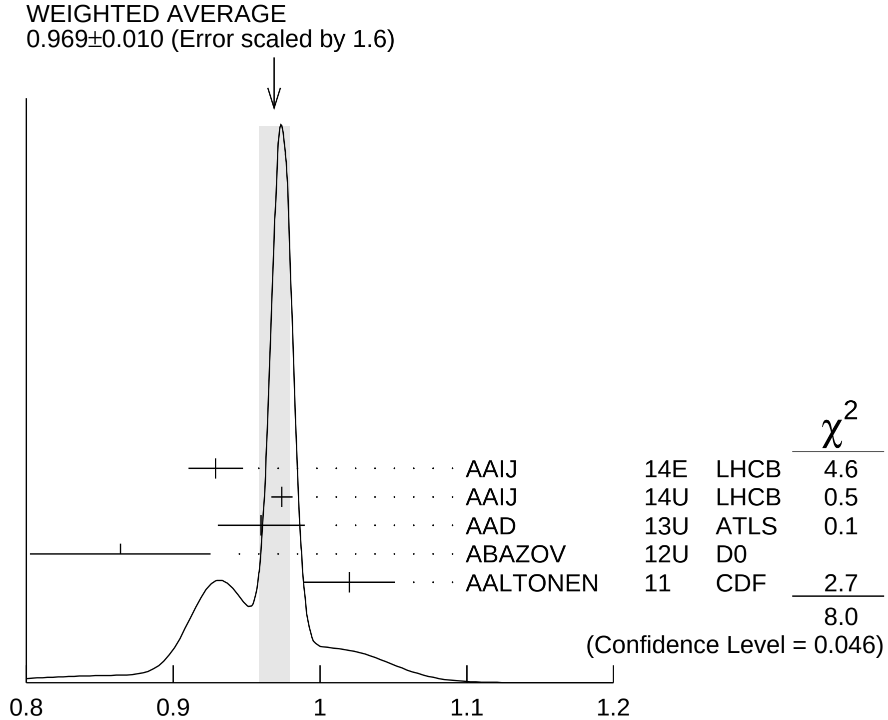
$\tau_{\Lambda_b^0}/\tau_{B^0}$ MEAN LIFE RATIO

$\tau_{\Lambda_b^0}/\tau_{B^0}$ (direct measurements)

"OUR EVALUATION" has been obtained by the Heavy Flavor Averaging Group (HFAG) by including both B^0 and B^+ decays.

VALUE	DOCUMENT ID		TECN	COMMENT
0.964±0.007 OUR EVALUATION				
0.969±0.010 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.			
0.929±0.018±0.004	[1] AAIJ	14E	LHCB	pp at 7 TeV
0.974±0.006±0.004	[2] AAIJ	14U	LHCB	pp at 7, 8 TeV
0.960±0.025±0.016	[3] AAD	13U	ATLS	pp at 7 TeV
0.864±0.052±0.033	[4,5] ABAZOV	12U	D0	$p\overline{p}$ at 1.96 TeV
1.020±0.030±0.008	[4] AALTONEN	11	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.976±0.012±0.006	[6] AAIJ	13BB	LHCB	Repl. by AAIJ 14U
$0.811^{+0.096}_{-0.087}\pm0.034$	[4,5] ABAZOV	07S	D0	Repl. by ABAZOV 12U
1.041±0.057	[7] ABULENCIA	07A	CDF	Repl. by AALTONEN 11
$0.87^{+0.17}_{-0.14}\pm0.03$	[7] ABAZOV	05C	D0	Repl. by ABAZOV 07S

[1] Measured using $\Lambda_b^0 \rightarrow J/\psi \Lambda$ and $B^0 \rightarrow J/\psi K^{*0}$ decays.
[2] Used $\Lambda_b^0 \rightarrow J/\psi p K^-$ and $B^0 \rightarrow J/\psi K^*(892)^0$ decays.
[3] Measured with $\Lambda_b^0 \rightarrow J/\psi(\mu^+\mu^-)\ \Lambda^0(p\pi^-)$ decays.
[4] Uses fully reconstructed $\Lambda_b \rightarrow J/\psi \Lambda$ decays.
[5] Uses $B^0 \rightarrow J/\psi K_S^0$ decays for denominator.
[6] Measures $1/\tau_{\Lambda_b^0} - 1/\tau_{B^0}$ and uses $\tau_{B^0} = 1.519 \pm 0.007$ ps to extract lifetime ratio.
[7] Measured mean life ratio using fully reconstructed decays.



$\tau_{\Lambda_b^0}/\tau_{B^0}$ (direct measurements)

Λ_b^0 DECAY MODES

The branching fractions B(b-baryon $\rightarrow$ $\Lambda \ell^- \overline{\nu}_\ell$ anything) and B($\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell$ anything) are not pure measurements because the underlying measured products of these with B($b \rightarrow$ b-baryon) were used to determine B($b \rightarrow$ b-baryon), as described in the note "Production and Decay of b-Flavored Hadrons."

For inclusive branching fractions, *e.g.*, $\Lambda_b \rightarrow \overline{\Lambda}_c$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$J/\psi(1S)\Lambda \times$ B($b \rightarrow$ Λ_b^0)		$(5.8 \pm 0.8) \times 10^{-5}$	
Γ_2	$J/\psi(1S)\Lambda$			
Γ_3	$\psi(2S)\Lambda$			
Γ_4	$p D^0 \pi^-$		$(6.4 \pm 0.7) \times 10^{-4}$	
Γ_5	$p D^0 K^-$		$(4.7 \pm 0.8) \times 10^{-5}$	
Γ_6	$p J/\psi \pi^-$		$(2.6 {}^{+0.5}_{-0.4}) \times 10^{-5}$	
Γ_7	$p J/\psi K^-$		$(3.2 {}^{+0.6}_{-0.5}) \times 10^{-4}$	
Γ_8	$P_c(4380)^+ K^-$, $P_c \rightarrow p J/\psi$	[a]	$(2.7 \pm 1.4) \times 10^{-5}$	
Γ_9	$P_c(4450)^+ K^-$, $P_c \rightarrow p J/\psi$	[a]	$(1.3 \pm 0.4) \times 10^{-5}$	

Γ_{10}	$p\overline{K}^0\pi^-$		$(1.3\ \pm 0.4\ ) \times 10^{-5}$	
Γ_{11}	pK^0K^-		$< 3.5 \times 10^{-6}$	CL=90%
Γ_{12}	$\Lambda_c^+\pi^-$		$(4.9\ \pm 0.4\ ) \times 10^{-3}$	S=1.2
Γ_{13}	$\Lambda_c^+K^-$		$(3.59 \pm 0.30) \times 10^{-4}$	S=1.2
Γ_{14}	$\Lambda_c^+a_1(1260)^-$		seen	
Γ_{15}	$\Lambda_c^+D^-$		$(4.6\ \pm 0.6\ ) \times 10^{-4}$	
Γ_{16}	$\Lambda_c^+D_s^-$		(1.10 ± 0.10) %	
Γ_{17}	$\Lambda_c^+\pi^+\pi^-\pi^-$		$(7.7\ \pm 1.1\ ) \times 10^{-3}$	S=1.1
Γ_{18}	$\Lambda_c(2595)^+\pi^-$, $\Lambda_c(2595)^+ \to \Lambda_c^+\pi^+\pi^-$		$(3.4\ \pm 1.5\ ) \times 10^{-4}$	
Γ_{19}	$\Lambda_c(2625)^+\pi^-$, $\Lambda_c(2625)^+ \to \Lambda_c^+\pi^+\pi^-$		$(3.3\ \pm 1.3\ ) \times 10^{-4}$	
Γ_{20}	$\Sigma_c(2455)^0\pi^+\pi^-$, $\Sigma_c^0 \to \Lambda_c^+\pi^-$		$(5.7\ \pm 2.2\ ) \times 10^{-4}$	
Γ_{21}	$\Sigma_c(2455)^{++}\pi^-\pi^-$, $\Sigma_c^{++} \to \Lambda_c^+\pi^+$		$(3.2\ \pm 1.6\ ) \times 10^{-4}$	
Γ_{22}	$\Lambda K^0 2\pi^+ 2\pi^-$			
Γ_{23}	$\Lambda_c^+\ell^-\overline{\nu}_\ell$ anything	[b]	$(10.3\ \pm 2.2\ )$ %	
Γ_{24}	$\Lambda_c^+\ell^-\overline{\nu}_\ell$		$(6.2\ ^{+1.4}_{-1.3})$ %	
Γ_{25}	$\Lambda_c^+\pi^+\pi^-\ell^-\overline{\nu}_\ell$		$(5.6\ \pm 3.1\ )$ %	
Γ_{26}	$\Lambda_c(2595)^+\ell^-\overline{\nu}_\ell$		$(7.9\ ^{+4.0}_{-3.5}) \times 10^{-3}$	
Γ_{27}	$\Lambda_c(2625)^+\ell^-\overline{\nu}_\ell$		$(1.3\ ^{+0.6}_{-0.5})$ %	
Γ_{28}	$\Sigma_c(2455)^0\pi^+\ell^-\overline{\nu}_\ell$			
Γ_{29}	$\Sigma_c(2455)^{++}\pi^-\ell^-\overline{\nu}_\ell$			
Γ_{30}	ph^-	[c]	$< 2.3 \times 10^{-5}$	CL=90%
Γ_{31}	$p\pi^-$		$(4.2\ \pm 0.8\ ) \times 10^{-6}$	
Γ_{32}	pK^-		$(5.1\ \pm 1.0\ ) \times 10^{-6}$	
Γ_{33}	pD_s^-		$< 4.8 \times 10^{-4}$	CL=90%
Γ_{34}	$p\mu^-\overline{\nu}_\mu$		$(4.1\ \pm 1.0\ ) \times 10^{-4}$	
Γ_{35}	$\Lambda\mu^+\mu^-$		$(1.08 \pm 0.28) \times 10^{-6}$	
Γ_{36}	$\Lambda\gamma$		$< 1.3 \times 10^{-3}$	CL=90%
Γ_{37}	$\Lambda^0\eta$		$(9\ ^{+7}_{-5}) \times 10^{-6}$	
Γ_{38}	$\Lambda^0\eta'(958)$		$< 3.1 \times 10^{-6}$	CL=90%

[a] P_c^+ is a pentaquark-charmonium state.

[b] Not a pure measurement. See note at head of Λ_b^0 Decay Modes.

[c] Here h^- means π^- or K^-.

CONSTRAINED FIT INFORMATION

An overall fit to 10 branching ratios uses 12 measurements and one constraint to determine 7 parameters. The overall fit has a $\chi^2 = 10.7$ for 6 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_{13}	94				
x_{17}	50	47			
x_{24}	14	14	7		
x_{31}	0	0	0	0	
x_{32}	0	0	0	0	83
	x_{12}	x_{13}	x_{17}	x_{24}	x_{31}

Λ_b^0 BRANCHING RATIOS

$\Gamma\big(J/\psi(1S)\Lambda \times B(b \to \Lambda_b^0)\big)/\Gamma_{total}$ — Γ_1/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN	COMMENT
5.8 ± 0.8 OUR AVERAGE					
$6.01 \pm 0.60 \pm 0.58 \pm 0.28$		[1] ABAZOV	11O	D0	$p\overline{p}$ at 1.96 TeV
$4.7 \pm 2.3 \pm 0.2$		[2] ABE	97B	CDF	$p\overline{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$180 \pm 60 \pm 90$	16	ALBAJAR	91E	UA1	$p\overline{p}$ at 630 GeV

[1] ABAZOV 11O uses $B(B^0 \to J/\psi K_S^0) \times B(b \to B^0) = (1.74 \pm 0.08) \times 10^{-4}$ to obtain the result. The $(\pm 0.08) \times 10^{-4}$ uncertainty of this product is listed as the last uncertainty of the measurement, $(\pm 0.28) \times 10^{-5}$.

[2] ABE 97B reports $[B(\Lambda_b^0 \to J/\psi \Lambda) \times B(b \to \Lambda_b^0)]$ / $[B(B^0 \to J/\psi K_S^0) \times B(b \to B^0)] = 0.27 \pm 0.12 \pm 0.05$. We multiply by our best value $B(B^0 \to J/\psi K_S^0) \times B(b \to B^0) = (1.74 \pm 0.08) \times 10^{-4}$. Our first error is their experiment error and our second error is the systematic error from using our best value.

$\Gamma\big(\psi(2S)\Lambda\big)/\Gamma\big(J/\psi(1S)\Lambda\big)$ — Γ_3/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
0.50±0.03±0.02	[1] AAD	15CH	ATLS	pp at 8 TeV

[1] AAD 15CH uses $B(J/\psi \to \mu^+\mu^-) = (5.961 \pm 0.033) \times 10^{-2}$ (PDG 14). And $B(\psi(2S) \to \mu^+\mu^-) = (7.89 \pm 0.17) \times 10^{-3}$ (PDG 14) is used assuming lepton universality.

$\Gamma\big(p D^0 \pi^-\big)/\Gamma_{total}$ — Γ_4/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	52	BARI	91	SFM	$D^0 \to K^-\pi^+$
seen		BASILE	81	SFM	$D^0 \to K^-\pi^+$

$\Gamma(pD^0K^-)/\Gamma(pD^0\pi^-)$ — Γ_5/Γ_4

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$7.3\pm0.8^{+0.5}_{-0.6}$	AAIJ	14H	LHCB	pp at 7 TeV

$\Gamma(pJ/\psi\pi^-)/\Gamma(pJ/\psi K^-)$ — Γ_6/Γ_7

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$8.24\pm0.25\pm0.42$	AAIJ	14K	LHCB	pp at 7, 8 TeV

$\Gamma(pJ/\psi K^-)/\Gamma_{total}$ — Γ_7/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$3.17\pm0.04^{+0.57}_{-0.45}$	[1] AAIJ	16A	LHCB	pp at 7, 8 TeV

[1] AAIJ 16A reported the measurement of $(3.17 \pm 0.04 \pm 0.07 \pm 0.34^{+0.45}_{-0.28}) \times 10^{-4}$ where the first uncertainty is statistical, the second is systematic, the third is due to the branching fraction of $B^0 \to J/\psi K^*(892)^0$, and the fourth is due to the knowledge of f_{Λ_b}/f_d. We combined in quadrature second to fourth uncertainties to a total systematic uncertainty.

$\Gamma(P_c(4380)^+K^-,\ P_c \to pJ/\psi)/\Gamma_{total}$ — Γ_8/Γ

P_c^+ is a pentaquark-charmonium state.

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$2.66\pm0.22^{+1.41}_{-1.38}$	[1] AAIJ	16A	LHCB	pp at 7, 8 TeV

[1] AAIJ 16 total systematic includes the uncertainties on $f(P_c^+)$ and $B(\Lambda_b \to pJ/\psi K^-)$.

$\Gamma(P_c(4450)^+K^-,\ P_c \to pJ/\psi)/\Gamma_{total}$ — Γ_9/Γ

P_c^+ is a pentaquark-charmonium state.

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$1.30\pm0.16^{+0.42}_{-0.39}$	[1] AAIJ	16A	LHCB	pp at 7, 8 TeV

[1] AAIJ 16 total systematic includes the uncertainties on $f(P_c^+)$ and $B(\Lambda_b \to pJ/\psi K^-)$.

$\Gamma(p\overline{K}^0\pi^-)/\Gamma_{total}$ — Γ_{10}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
$1.26\pm0.19\pm0.36$	[1] AAIJ	14Q	LHCB	pp at 7 TeV

[1] Used the normalizing mode branching fraction value of $B(B^0 \to K^0\pi^+\pi^-) = (4.96 \pm 0.20) \times 10^{-5}$.

$\Gamma(pK^0K^-)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.5\times10^{-6}$	90	AAIJ	14Q	LHCB	pp at 7 TeV

$\Gamma(\Lambda_c^+ \pi^-)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9 ±0.4 OUR FIT Error includes scale factor of 1.2.					
4.9 ±0.5 OUR AVERAGE Error includes scale factor of 1.5.					
$4.57^{+0.31}_{-0.30}\pm0.23$		[1] AAIJ	14I	LHCB	pp at 7 TeV
$5.97\pm0.28\pm0.81$		[2] AAIJ	14Q	LHCB	pp at 7 TeV
$8.8\ \pm2.8\ \pm1.5$		[3] ABULENCIA	07B	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	3	ABREU	96N	DLPH	$\Lambda_c^+ \to pK^-\pi^+$
seen	4	BUSKULIC	96L	ALEP	$\Lambda_c^+ \to pK^-\pi^+$, $p\overline{K}^0$, $\Lambda\pi^+\pi^+\pi^-$

[1] AAIJ 14I reports $(4.30 \pm 0.03^{+0.12}_{-0.11} \pm 0.26 \pm 0.21) \times 10^{-3}$ from a measurement of $[\Gamma(\Lambda_b^0 \to \Lambda_c^+\pi^-)/\Gamma_{total}] \times [B(B^0 \to D^-\pi^+)]$ assuming $B(B^0 \to D^-\pi^+) = (2.68 \pm 0.13) \times 10^{-3}$, which we rescale to our best value $B(B^0 \to D^-\pi^+) = (2.52 \pm 0.13) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Uses information on f_{baryon}/f_d from measurement in semileptonic decays by the same authors.

[2] Obtained using the branching fraction of $\Lambda_c^+ \to pK^-\pi^+$ decay.

[3] The result is obtained from (f_{baryon}/f_d) $(B(\Lambda_b^0 \to \Lambda_c^+\pi^-)/B(\overline{B}^0 \to D^+\pi^-)) = 0.82 \pm 0.08 \pm 0.11 \pm 0.22$, assuming $f_{baryon}/f_d = 0.25 \pm 0.04$ and $B(\overline{B}^0 \to D^+\pi^-) = (2.68 \pm 0.13) \times 10^{-3}$.

$\Gamma(pD^0\pi^-)/\Gamma(\Lambda_c^+\pi^-)$ — Γ_4/Γ_{12}

VALUE	DOCUMENT ID		TECN	COMMENT
0.130±0.007±0.007	[1] AAIJ	14H	LHCB	pp at 7 TeV

[1] AAIJ 14H reports $[\Gamma(\Lambda_b^0 \to pD^0\pi^-)/\Gamma(\Lambda_b^0 \to \Lambda_c^+\pi^-)] \times [B(D^0 \to K^-\pi^+)] / [B(\Lambda_c^+ \to pK^-\pi^+)] = (8.06 \pm 0.23 \pm 0.35) \times 10^{-2}$ which we multiply or divide by our best values $B(D^0 \to K^-\pi^+) = (3.93 \pm 0.04) \times 10^{-2}$, $B(\Lambda_c^+ \to pK^-\pi^+) = (6.35 \pm 0.33) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(\Lambda_c^+ K^-)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.59±0.30 OUR FIT Error includes scale factor of 1.2.				
3.55±0.44±0.50	[1] AAIJ	14Q	LHCB	pp at 7 TeV

[1] Obtained using the branching fraction of $\Lambda_c^+ \to pK^-\pi^+$ decay.

$\Gamma(\Lambda_c^+ K^-)/\Gamma(\Lambda_c^+\pi^-)$ — Γ_{13}/Γ_{12}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
7.31±0.22 OUR FIT				
7.31±0.16±0.16	AAIJ	14H	LHCB	pp at 7 TeV

$\Gamma(\Lambda_c^+ a_1(1260)^-)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	1	ABREU	96N	DLPH	$\Lambda_c^+ \to pK^-\pi^+$, $a_1^- \to \rho^0\pi^- \to \pi^+\pi^-\pi^-$

$\Gamma(\Lambda_c^+ D_s^-)/\Gamma_{total}$ — Γ_{16}/Γ

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
1.1±0.1	[1] AAIJ	14AA	LHCB	pp at 7 TeV

[1] Uses $B(\overline{B}^0 \to D^+ D_s^-) = (7.2 \pm 0.8) \times 10^{-3}$ and their measured $B(\Lambda_b^0 \to \Lambda_c^+ \pi^-))/B(\overline{B}^0 \to D^+\pi^-)$ values.

$\Gamma(\Lambda_c^+ D^-)/\Gamma(\Lambda_c^+ D_s^-)$ — Γ_{15}/Γ_{16}

VALUE	DOCUMENT ID		TECN	COMMENT
0.042±0.003±0.003	AAIJ	14AA	LHCB	pp at 7 TeV

$\Gamma(\Lambda_c^+ \pi^+\pi^-\pi^-)/\Gamma_{total}$ — Γ_{17}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
7.7±1.1 OUR FIT Error includes scale factor of 1.1.					
$14.9^{+3.8}_{-3.2}\pm1.2$		[1] AALTONEN	12A	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	90	BARI	91	SFM	$\Lambda_c^+ \to pK^-\pi^+$

[1] AALTONEN 12A reports $[\Gamma(\Lambda_b^0 \to \Lambda_c^+\pi^+\pi^-\pi^-)/\Gamma_{total}] / [B(\Lambda_b^0 \to \Lambda_c^+\pi^-)] = 3.04 \pm 0.33^{+0.70}_{-0.55}$ which we multiply by our best value $B(\Lambda_b^0 \to \Lambda_c^+\pi^-) = (4.9 \pm 0.4) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\Lambda_c^+ \pi^+\pi^-\pi^-)/\Gamma(\Lambda_c^+\pi^-)$ — Γ_{17}/Γ_{12}

VALUE	DOCUMENT ID		TECN	COMMENT
1.56±0.21 OUR FIT				
1.43±0.16±0.13	AAIJ	11E	LHCB	pp at 7 TeV

$\Gamma(\Lambda_c(2595)^+\pi^-, \Lambda_c(2595)^+ \to \Lambda_c^+\pi^+\pi^-)/\Gamma(\Lambda_c^+\pi^+\pi^-\pi^-)$ — Γ_{18}/Γ_{17}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
$4.4\pm1.7^{+0.6}_{-0.4}$	AAIJ	11E	LHCB	pp at 7 TeV

$\Gamma(\Lambda_c(2625)^+\pi^-, \Lambda_c(2625)^+ \to \Lambda_c^+\pi^+\pi^-)/\Gamma(\Lambda_c^+\pi^+\pi^-\pi^-)$ — Γ_{19}/Γ_{17}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
4.3±1.5±0.4	AAIJ	11E	LHCB	pp at 7 TeV

$\Gamma(\Sigma_c(2455)^0\pi^+\pi^-, \Sigma_c^0 \to \Lambda_c^+\pi^-)/\Gamma(\Lambda_c^+\pi^+\pi^-\pi^-)$ — Γ_{20}/Γ_{17}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
7.4±2.4±1.2	AAIJ	11E	LHCB	pp at 7 TeV

$\Gamma\big(\Sigma_c(2455)^{++}\pi^-\pi^-, \Sigma_c^{++} \to \Lambda_c^+\pi^+\big)/\Gamma\big(\Lambda_c^+\pi^+\pi^-\pi^-\big)$ Γ_{21}/Γ_{17}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
4.2±1.8±0.7	AAIJ	11E	LHCB	pp at 7 TeV

$\Gamma\big(\Lambda K^0 2\pi^+ 2\pi^-\big)/\Gamma_{total}$ Γ_{22}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	4	[1] ARENTON	86	FMPS	$\Lambda K^0_S 2\pi^+ 2\pi^-$

[1] See the footnote to the ARENTON 86 mass value.

$\Gamma\big(\Lambda_c^+\ell^-\overline{\nu}_\ell \text{anything}\big)/\Gamma_{total}$ Γ_{23}/Γ

The values and averages in this section serve only to show what values result if one assumes our B($b \to$ b-baryon). They cannot be thought of as measurements since the underlying product branching fractions were also used to determine B($b \to$ b-baryon) as described in the note on "Production and Decay of b-Flavored Hadrons."

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.103±0.022 OUR AVERAGE					
0.097±0.018±0.014		[1] BARATE	98D	ALEP	$e^+e^- \to Z$
$0.13\ ^{+0.05}_{-0.04}\ \pm0.02$	29	[2] ABREU	95S	DLPH	$e^+e^- \to Z$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.085±0.021±0.012	55	[3] BUSKULIC	95L	ALEP	Repl. by BARATE 98D
0.17 ±0.06 ±0.02	21	[4] BUSKULIC	92E	ALEP	$\Lambda_c^+ \to pK^-\pi^+$

[1] BARATE 98D reports $[\Gamma\big(\Lambda_b^0 \to \Lambda_c^+\ell^-\overline{\nu}_\ell \text{anything}\big)/\Gamma_{total}] \times [B(\overline{b} \to b\text{-baryon})] = 0.0086 \pm 0.0007 \pm 0.0014$ which we divide by our best value $B(\overline{b} \to b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Measured using $\Lambda_c\ell^-$ and $\Lambda\ell^+\ell^-$.

[2] ABREU 95S reports $[\Gamma\big(\Lambda_b^0 \to \Lambda_c^+\ell^-\overline{\nu}_\ell \text{anything}\big)/\Gamma_{total}] \times [B(\overline{b} \to b\text{-baryon})] = 0.0118 \pm 0.0026 ^{+0.0031}_{-0.0021}$ which we divide by our best value $B(\overline{b} \to b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] BUSKULIC 95L reports $[\Gamma\big(\Lambda_b^0 \to \Lambda_c^+\ell^-\overline{\nu}_\ell \text{anything}\big)/\Gamma_{total}] \times [B(\overline{b} \to b\text{-baryon})] = 0.00755 \pm 0.0014 \pm 0.0012$ which we divide by our best value $B(\overline{b} \to b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] BUSKULIC 92E reports $[\Gamma\big(\Lambda_b^0 \to \Lambda_c^+\ell^-\overline{\nu}_\ell \text{anything}\big)/\Gamma_{total}] \times [B(\overline{b} \to b\text{-baryon})] = 0.015 \pm 0.0035 \pm 0.0045$ which we divide by our best value $B(\overline{b} \to b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Superseded by BUSKULIC 95L.

$\Gamma\big(\Lambda_c^+\ell^-\overline{\nu}_\ell\big)/\Gamma_{total}$ Γ_{24}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.062^{+0.014}_{-0.013}}$ **OUR FIT**				
$\mathbf{0.050^{+0.011}_{-0.008}{}^{+0.016}_{-0.012}}$	[1] ABDALLAH	04A	DLPH	$e^+e^- \to Z^0$

[1] Derived from a combined likelihood and event rate fit to the distribution of the Isgur-Wise variable and using HQET. The slope of the form factor is measured to be $\rho^2 = 2.03 \pm 0.46^{+0.72}_{-1.00}$.

$\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell)/\Gamma(\Lambda_c^+ \pi^-)$ — Γ_{24}/Γ_{12}

VALUE	DOCUMENT ID		TECN	COMMENT
$12.7^{+3.1}_{-2.7}$ OUR FIT				
$16.6 \pm 3.0^{+2.8}_{-3.6}$	AALTONEN	09E	CDF	$p\overline{p}$ at 1.96 TeV

$\Gamma(\Lambda_c^+ \pi^+ \pi^- \ell^- \overline{\nu}_\ell)/\Gamma_{\text{total}}$ — Γ_{25}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
$0.056^{+0.031}_{-0.030}$	[1] ABDALLAH	04A	DLPH	$e^+ e^- \rightarrow Z^0$

[1] Derived from the fraction of $\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell)$ / ($\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \overline{\nu}_\ell)$ + $\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^+ \pi^- \ell^- \overline{\nu}_\ell)$) = $0.47^{+0.10}_{-0.08}{}^{+0.07}_{-0.06}$.

$\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell)/\left[\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell) + \Gamma(\Lambda_c^+ \pi^+ \pi^- \ell^- \overline{\nu}_\ell)\right]$ — $\Gamma_{24}/(\Gamma_{24}+\Gamma_{25})$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.47^{+0.10}_{-0.08}{}^{+0.07}_{-0.06}$	ABDALLAH	04A	DLPH	$e^+ e^- \rightarrow Z^0$

$\Gamma(\Lambda_c(2595)^+ \ell^- \overline{\nu}_\ell)/\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell)$ — Γ_{26}/Γ_{24}

VALUE	DOCUMENT ID		TECN	COMMENT
$0.126 \pm 0.033^{+0.047}_{-0.038}$	AALTONEN	09E	CDF	$p\overline{p}$ at 1.96 TeV

$\Gamma(\Lambda_c(2625)^+ \ell^- \overline{\nu}_\ell)/\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell)$ — Γ_{27}/Γ_{24}

VALUE	DOCUMENT ID		TECN	COMMENT
$0.210 \pm 0.042^{+0.071}_{-0.050}$	AALTONEN	09E	CDF	$p\overline{p}$ at 1.96 TeV

$\left[\frac{1}{2}\Gamma(\Sigma_c(2455)^0 \pi^+ \ell^- \overline{\nu}_\ell) + \frac{1}{2}\Gamma(\Sigma_c(2455)^{++} \pi^- \ell^- \overline{\nu}_\ell)\right]/\Gamma(\Lambda_c^+ \ell^- \overline{\nu}_\ell)$ — $(\frac{1}{2}\Gamma_{28}+\frac{1}{2}\Gamma_{29})/\Gamma_{24}$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.054 \pm 0.022^{+0.021}_{-0.018}$	AALTONEN	09E	CDF	$p\overline{p}$ at 1.96 TeV

$\Gamma(p h^-)/\Gamma_{\text{total}}$ — Γ_{30}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.3 \times 10^{-5}$	90	[1] ACOSTA	05O	CDF	$p\overline{p}$ at 1.96 TeV

[1] Assumes f_Λ / f_d = 0.25, and equal momentum distribution for Λ_b and B mesons.

$\Gamma(p\pi^-)/\Gamma_{\text{total}}$ — Γ_{31}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
4.2 ± 0.8 OUR FIT					
$3.7 \pm 0.8 \pm 0.6$		[1] AALTONEN	09C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<50	90	[2] BUSKULIC	96V	ALEP	$e^+ e^- \rightarrow Z$

[1] AALTONEN 09C reports $[\Gamma(\Lambda_b^0 \to p\pi^-)/\Gamma_{total}]$ / $[B(B^0 \to K^+\pi^-)]$ × $[B(\overline{b} \to b\text{-baryon})]$ / $[B(\overline{b} \to B^0)]$ = 0.042 ± 0.007 ± 0.006 which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $B(\overline{b} \to b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.

$\Gamma(pK^-)/\Gamma_{total}$ — Γ_{32}/Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID		TECN	COMMENT
5.1±1.0 OUR FIT					
5.9±1.1±0.9		[1] AALTONEN	09C	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<360	90	[2] ADAM	96D	DLPH	$e^+e^- \to Z$
< 50	90	[3] BUSKULIC	96V	ALEP	$e^+e^- \to Z$

[1] AALTONEN 09C reports $[\Gamma(\Lambda_b^0 \to pK^-)/\Gamma_{total}]$ / $[B(B^0 \to K^+\pi^-)]$ × $[B(\overline{b} \to b\text{-baryon})]$ / $[B(\overline{b} \to B^0)]$ = 0.066 ± 0.009 ± 0.008 which we multiply or divide by our best values $B(B^0 \to K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $B(\overline{b} \to b\text{-baryon}) = (8.9 \pm 1.3) \times 10^{-2}$, $B(\overline{b} \to B^0) = (40.4 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

[2] ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.

[3] BUSKULIC 96V assumes PDG 96 production fractions for B^0, B^+, B_s, b baryons.

$\Gamma(p\pi^-)/\Gamma(pK^-)$ — Γ_{31}/Γ_{32}

VALUE	DOCUMENT ID		TECN	COMMENT
0.84±0.09 OUR FIT				
0.86±0.08±0.05	AAIJ	12AR	LHCB	pp at 7 TeV

$\Gamma(pD_s^-)/\Gamma_{total}$ — Γ_{33}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<4.8 × 10^{-4}	90	AAIJ	14Q	LHCB	pp at 7 TeV

$\Gamma(p\mu^-\overline{\nu}_\mu)/\Gamma_{total}$ — Γ_{34}/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
4.1±1.0	[1] AAIJ	15BG	LHCB	pp at 8 TeV

[1] The ratio of $B(\Lambda_b^0 \to p\mu^-\overline{\nu}_\mu)$ to $B(\Lambda_b^0 \to \Lambda_c^+\mu^-\overline{\nu}_\mu)$ is measured within a restricted q^2 region. Combined with theoretical calculations of the form factors and the previously measured value of $|V_{cb}|$, the first $|V_{ub}| = (3.27 \pm 0.15 \pm 0.16 \pm 0.06) \times 10^{-3}$ measurement from the Λ_b decay is obtained, consistent with the exclusively measured world averages.

$\Gamma(p\mu^-\overline{\nu}_\mu)/\Gamma(\Lambda_c^+\ell^-\overline{\nu}_\ell)$ — Γ_{34}/Γ_{24}

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.0±0.04±0.08	[1] AAIJ	15BG	LHCB	pp at 8 TeV

[1] This measurement is a ratio of $\Gamma(\Lambda_b^0 \to p\mu^-\overline{\nu}_\mu)$[$q^2 > 15$ GeV/c^2] to $\Gamma(\Lambda_b^0 \to \Lambda_c^+\mu^-\overline{\nu}_\mu)$[$q^2 > 7$ GeV/c^2] within a restricted q^2 region. Combined with theoretical calculations of the form factors and the previously measured value of $|V_{cb}|$, the first $|V_{ub}|$ $= (3.27 \pm 0.15 \pm 0.16 \pm 0.06) \times 10^{-3}$ measurement from the Λ_b decay is obtained, consistent with the exclusively measured world averages.

$\Gamma(\Lambda\mu^+\mu^-)/\Gamma_{\text{total}}$ Γ_{35}/Γ

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
10.8±2.8 OUR AVERAGE				
9.6±1.6±2.5	[1] AAIJ	13AJ	LHCB	pp at 7 TeV
17.3±4.2±5.5	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Uses $B(\Lambda_b^0 \to J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$. This measurement comes from the sum of the differential rates in q^2 regions excluding those corresponding to J/ψ and $\psi(2S)$ ([8.68,10.09] and [12.86, 14.18] GeV^2/c^4).

$\Gamma(\Lambda\gamma)/\Gamma_{\text{total}}$ Γ_{36}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.3 × 10^{-3}	90	ACOSTA	02G	CDF	$p\overline{p}$ at 1.8 TeV

$\Gamma(\Lambda^0\eta)/\Gamma_{\text{total}}$ Γ_{37}/Γ

VALUE (units 10^{-6})	DOCUMENT ID		TECN	COMMENT
$9^{+7}_{-5}\pm1$	[1] AAIJ	15AH	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AH reports $[\Gamma(\Lambda_b^0 \to \Lambda^0\eta)/\Gamma_{\text{total}}]$ / $[B(B^0 \to \eta' K^0)] = 0.142^{+0.11}_{-0.08}$ which we multiply by our best value $B(B^0 \to \eta' K^0) = (6.6 \pm 0.4) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. The single uncertainty quoted with the original measurement combines in quadrature statistical and systematic uncertainties.

$\Gamma(\Lambda^0\eta'(958))/\Gamma_{\text{total}}$ Γ_{38}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<3.1 × 10^{-6}	90	[1] AAIJ	15AH	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AH reports $[\Gamma(\Lambda_b^0 \to \Lambda^0\eta'(958))/\Gamma_{\text{total}}]$ / $[B(B^0 \to \eta' K^0)] < 0.047$ which we multiply by our best value $B(B^0 \to \eta' K^0) = 6.6 \times 10^{-5}$.

PARTIAL BRANCHING FRACTIONS IN $\Lambda_b \to \Lambda\mu^+\mu^-$

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ ($q^2 < 2.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
0.71±0.27 OUR AVERAGE				
$0.72^{+0.24}_{-0.22}\pm0.14$	[1] AAIJ	15AE	LHCB	pp at 7, 8 TeV
0.15±2.01±0.05	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.56±0.76±0.80	[2] AAIJ	13AJ	LHCB	Repl. by AAIJ 15AE

[1] AAIJ 15AE measurement covers $0.1 < q^2 < 2.0$ GeV^2/c^4.
[2] Uses $B(\Lambda_b^0 \to J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(2.0 < q^2 < 4.3\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$0.28\ ^{+0.28}_{-0.21}$ OUR AVERAGE			
$0.253^{+0.276}_{-0.207}\pm0.046$	[1] AAIJ 15AE	LHCB	pp at 7, 8 TeV
$1.8\ \pm1.7\ \pm0.6$	AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.71\ \pm0.60\ \pm0.23$	[2] AAIJ 13AJ	LHCB	Repl. by AAIJ 15AE

[1] AAIJ 15AE measurement covers $2.0 < q^2 < 4.0\ GeV^2/c^4$.
[2] Uses $B(\Lambda_b^0 \to J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(q^2 < 4.3\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$2.7\pm2.5\pm0.9$	AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(4.0 < q^2 < 6.0\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$0.04^{+0.18}_{-0.00}\pm0.02$	AAIJ 15AE	LHCB	pp at 7, 8 TeV

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(1.0 < q^2 < 6.0\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$0.47^{+0.31}_{-0.27}$ OUR AVERAGE			
$0.45^{+0.30}_{-0.25}\pm0.10$	[1] AAIJ 15AE	LHCB	pp at 7 and 8 TeV
$1.3\ \pm2.1\ \pm0.4$	AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] AAIJ 15AE measurement covers $1.1 < q^2 < 6.0\ GeV^2/c^4$.

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(6.0 < q^2 < 8.0\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$0.50^{+0.24}_{-0.22}\pm0.10$	AAIJ 15AE	LHCB	pp at 7, 8 TeV

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(4.3 < q^2 < 8.68\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$0.5\ \pm0.7$ OUR AVERAGE			
$0.66\pm0.74\pm0.18$	[1] AAIJ 13AJ	LHCB	pp at 7 TeV
$-0.2\ \pm1.6\ \pm0.1$	AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV

[1] Uses $B(\Lambda_b^0 \to J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.

$B(\Lambda_b \to \Lambda\mu^+\mu^-)$ $(10.09 < q^2 < 12.86\ GeV^2/c^4)$

VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
$2.2\ \pm0.6$ OUR AVERAGE			
$2.08^{+0.42}_{-0.39}\pm0.42$	[1] AAIJ 15AE	LHCB	pp at 7, 8 TeV
$3.0\ \pm1.5\ \pm1.0$	AALTONEN 11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1.55\pm0.58\pm0.55$	[2] AAIJ 13AJ	LHCB	Repl. by AAIJ 15AE

[1] AAIJ 15AE measurement covers $11.0 < q^2 < 12.5$ GeV^2/c^4.
[2] Uses B($\Lambda_b^0 \to J/\psi \Lambda$) = $(6.2 \pm 1.4) \times 10^{-4}$.

B($\Lambda_b \to \Lambda \mu^+ \mu^-$) ($14.18 < q^2 < 16.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
1.7 ±0.5 OUR AVERAGE Error includes scale factor of 1.1.				
$2.04^{+0.35}_{-0.33} \pm 0.42$	[1] AAIJ	15AE	LHCB	pp at 7, 8 TeV
1.0 ±0.7 ±0.3	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.44±0.44±0.42	[2] AAIJ	13AJ	LHCB	Repl. by AAIJ 15AE

[1] AAIJ 15AE measurement covers $15.0 < q^2 < 16.0$ GeV^2/c^4.
[2] Uses B($\Lambda_b^0 \to J/\psi \Lambda$) = $(6.2 \pm 1.4) \times 10^{-4}$.

B($\Lambda_b \to \Lambda \mu^+ \mu^-$) ($16.0 < q^2$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
7.0 ±1.9 ±2.2	AALTONEN	11AI	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.73±0.77±1.25	[1,2] AAIJ	13AJ	LHCB	Repl. by AAIJ 15AE

[1] Uses B($\Lambda_b^0 \to J/\psi \Lambda$) = $(6.2 \pm 1.4) \times 10^{-4}$.
[2] Requires $16.00 < q^2 < 20.30$ GeV^2/c^4.

B($\Lambda_b \to \Lambda \mu^+ \mu^-$) ($18.0 < q^2 < 20.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
2.44±0.28±0.50	AAIJ	15AE	LHCB	pp at 7, 8 TeV

B($\Lambda_b \to \Lambda \mu^+ \mu^-$) ($15.0 < q^2 < 20.0$ GeV^2/c^4)

VALUE (units 10^{-7})	DOCUMENT ID		TECN	COMMENT
6.00±0.45±1.25	AAIJ	15AE	LHCB	pp at 7, 8 TeV

CP VIOLATION

A_{CP} is defined as

$$A_{CP} = \frac{B(\Lambda_b^0 \to f) - B(\overline{\Lambda}_b^0 \to \overline{f})}{B(\Lambda_b^0 \to f) + B(\overline{\Lambda}_b^0 \to \overline{f})},$$

the CP-violation asymmetry of exclusive Λ_b^0 and $\overline{\Lambda}_b^0$ decay.

$A_{CP}(\Lambda_b \to p \pi^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.06±0.07 OUR AVERAGE				
0.06±0.07±0.03	AALTONEN	14P	CDF	$p\overline{p}$ at 1.96 TeV
0.03±0.17±0.05	AALTONEN	11N	CDF	$p\overline{p}$ at 1.96 TeV

$A_{CP}(\Lambda_b \to p K^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.00±0.19 OUR AVERAGE Error includes scale factor of 2.4.				
−0.10±0.08±0.04	AALTONEN	14P	CDF	$p\overline{p}$ at 1.96 TeV
0.37±0.17±0.03	AALTONEN	11N	CDF	$p\overline{p}$ at 1.96 TeV

$A_{CP}(\Lambda_b \to p\overline{K}^0\pi^-)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.22±0.13±0.03	AAIJ	14Q	LHCB	pp at 7 TeV

$\Delta A_{CP}(J/\psi p\pi^-/K^-) \equiv A_{CP}(J/\psi p\pi^-) - A_{CP}(J/\psi pK^-)$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.7±2.4±1.2	AAIJ	14K	LHCB	pp at 7, 8 TeV

Λ_b^0 DECAY PARAMETERS

See the note on "Baryon Decay Parameters" in the neutron Listings.

α decay parameter for $\Lambda_b \to J/\psi\Lambda$

VALUE	DOCUMENT ID		TECN	COMMENT
0.18±0.13 OUR AVERAGE				
0.30±0.16±0.06	[1] AAD	14L	ATLS	pp at 7 TeV
0.05±0.17±0.07	[2] AAIJ	13AG	LHCB	pp at 7 TeV

[1] An angular analysis of $\Lambda_b \to J/\psi\Lambda$ decay is performed and magnitudes of all helicity amplitudes are also reported.

[2] An angular analysis of $\Lambda_b \to J/\psi\Lambda$ decay is performed and a Λ_b transverse production polarization of 0.06 ± 0.07 ± 0.02 is also reported.

$A^{\ell}_{FB}(\mu\mu)$ in $\Lambda_b \to \Lambda\mu^+\mu^-$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.05±0.09±0.03	[1] AAIJ	15AE	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AE measurement covers $15.0 < q^2 < 20.0$ GeV^2/c^4.

$A^{h}_{FB}(p\pi)$ in $\Lambda_b \to \Lambda(p\pi)\mu^+\mu^-$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.29±0.07±0.03	[1] AAIJ	15AE	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AE measurement covers $15.0 < q^2 < 20.0$ GeV^2/c^4.

$f_L(\mu\mu)$ longitudinal polarization fraction in $\Lambda_b \to \Lambda\mu^+\mu^-$

VALUE	DOCUMENT ID		TECN	COMMENT
$0.61^{+0.11}_{-0.14}$±0.03	[1] AAIJ	15AE	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AE measurement covers $15.0 < q^2 < 20.0$ GeV^2/c^4.

FORWARD-BACKWARD ASYMMETRIES

The forward-backward assymmetry is defined as $A_{FB}(\Lambda_b^0)$ = [N(F) − N(B)] / [N(F) + N(B)], where the forward (F) direction corresponds to a particle (Λ_b^0 or Λ_b^-) sharing valence quark flavors with a beam particle with the same sign of rapidity.

$A_{FB}(\Lambda_b^0 \to J/\psi\Lambda)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.04±0.07±0.02	[1] ABAZOV	15I	D0	$p\overline{p}$ at 1.96 TeV

[1] The measured asymmetry integrated over rapidity y in the range of $0.1 < |y| < 2.0$.

Λ_b^0 REFERENCES

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AAIJ	16A	CPC 40 011001	R. Aaij *et al.*	(LHCb Collab.)
AAD	15CH	PL B751 63	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	15AE	JHEP 1506 115	R. Aaji *et al.*	(LHCb Collab.)
AAIJ	15AH	JHEP 1509 006	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15BG	NATP 11 743	R. Aaij *et al.*	(LHCb Collab.)
ABAZOV	15I	PR D91 072008	V.M. Abazov *et al.*	(D0 Collab.)
AAD	14L	PR D89 092009	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	14AA	PRL 112 202001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14E	JHEP 1404 114	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14H	PR D89 032001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14I	JHEP 1408 143	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14K	JHEP 1407 103	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14Q	JHEP 1404 087	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	14U	PL B734 122	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14B	PR D89 072014	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN	14P	PRL 113 242001	T. Aaltonen *et al.*	(CDF Collab.)
PDG	14	CPC 38 070001	K. Olive *et al.*	(PDG Collab.)
AAD	13U	PR D87 032002	G. Aad *et al.*	(ATLAS Collab.)
AAIJ	13AG	PL B724 27	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13AJ	PL B725 25	R. Aaij *et al.*	(LHCb Collab.)
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CHATRCHYAN	13AC	JHEP 1307 163	S. Chatrchyan *et al.*	(CMS Collab.)
AAIJ	12AR	JHEP 1210 037	R. Aaij *et al.*	(LHCb Collab.)
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AALTONEN	12A	PR D85 032003	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	12U	PR D85 112003	V.M. Abazov *et al.*	(D0 Collab.)
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AALTONEN	11	PRL 106 121804	T. Aaltonen *et al.*	(CDF Collab.)
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AALTONEN	11N	PRL 106 181802	T. Aaltonen *et al.*	(CDF Collab.)
ABAZOV	11O	PR D84 031102	V.M. Abazov *et al.*	(D0 Collab.)
AALTONEN	10B	PRL 104 102002	T. Aaltonen *et al.*	(CDF Collab.)
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ACOSTA	05O	PR D72 051104	D. Acosta *et al.*	(CDF Collab.)
ABDALLAH	04A	PL B585 63	J. Abdallah *et al.*	(DELPHI Collab.)
ACOSTA	02G	PR D66 112002	D. Acosta *et al.*	(CDF Collab.)
ABREU	99W	EPJ C10 185	P. Abreu *et al.*	(DELPHI Collab.)
ACKERSTAFF	98G	PL B426 161	K. Ackerstaff *et al.*	(OPAL Collab.)
BARATE	98D	EPJ C2 197	R. Barate *et al.*	(ALEPH Collab.)
ABE	97B	PR D55 1142	F. Abe *et al.*	(CDF Collab.)
ABE	96M	PRL 77 1439	F. Abe *et al.*	(CDF Collab.)
ABREU	96D	ZPHY C71 199	P. Abreu *et al.*	(DELPHI Collab.)
ABREU	96N	PL B374 351	P. Abreu *et al.*	(DELPHI Collab.)
ADAM	96D	ZPHY C72 207	W. Adam *et al.*	(DELPHI Collab.)
BUSKULIC	96L	PL B380 442	D. Buskulic *et al.*	(ALEPH Collab.)
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PDG	96	PR D54 1	R. M. Barnett *et al.*	(PDG Collab.)
ABREU	95S	ZPHY C68 375	P. Abreu *et al.*	(DELPHI Collab.)
AKERS	95K	PL B353 402	R. Akers *et al.*	(OPAL Collab.)
BUSKULIC	95L	PL B357 685	D. Buskulic *et al.*	(ALEPH Collab.)
ABE	93B	PR D47 R2639	F. Abe *et al.*	(CDF Collab.)
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