

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

In the quark model, a Λ_b^0 is an isospin-0 udb 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
5619.5 ± 0.4 OUR AVERAGE				
5619.7 ± 0.7 ± 1.1		¹ AAD	13U ATLS	$p\bar{p}$ at 7 TeV
5619.44 ± 0.13 ± 0.38		² AAIJ	13AV LHCb	$p\bar{p}$ at 7 TeV
5619.7 ± 1.2 ± 1.2		³ ACOSTA	06 CDF	$p\bar{p}$ at 1.96 TeV
5621 ± 4 ± 3		⁴ ABE	97B CDF	$p\bar{p}$ at 1.8 TeV
5668 ± 16 ± 8	4	⁵ ABREU	96N DLPH	$e^+e^- \rightarrow Z$
5614 ± 21 ± 4	4	⁵ 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		¹ AAIJ	12E LHCb	Repl. by AAIJ 13AV
not seen		⁶ ABE	93B CDF	Sup. by ABE 97B
5640 ± 50 ± 30	16	⁷ ALBAJAR	91E UA1	$p\bar{p}$ 630 GeV
5640 ⁺¹⁰⁰ / ₋₂₁₀	52	BARI	91 SFM	$\Lambda_b^0 \rightarrow p D^0 \pi^-$
5650 ⁺¹⁵⁰ / ₋₂₀₀	90	BARI	91 SFM	$\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^+ \pi^- \pi^-$

¹ Uses $\Lambda_b^0 \rightarrow J/\psi \Lambda$ fully reconstructed decays.

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

³ Uses exclusively reconstructed final states containing a $J/\psi \rightarrow \mu^+ \mu^-$ decays.

⁴ 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.

⁵ Uses 4 fully reconstructed Λ_b events.

⁶ ABE 93B states that, based on the signal claimed by ALBAJAR 91E, CDF should have found $30 \pm 23 \Lambda_b^0 \rightarrow J/\psi(1S) \Lambda$ 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	⁸ ACOSTA	06 CDF	$p\bar{p}$ at 1.96 TeV

⁸ Uses exclusively reconstructed final states containing $J/\psi \rightarrow \mu^+ \mu^-$ decays.

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
339.71 ± 0.71 ± 0.09	⁹ AAIJ	12E LHCb	$p\bar{p}$ at 7 TeV

⁹ Uses exclusively reconstructed final states containing $J/\psi \rightarrow \mu^+ \mu^-$ 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
1.451 ± 0.013 OUR EVALUATION				
1.415 ± 0.027 ± 0.006	10	AAIJ	14E LHCb	pp at 7 TeV
1.449 ± 0.036 ± 0.017	10	AAD	13U ATLAS	pp at 7 TeV
1.503 ± 0.052 ± 0.031	10	CHATRCHYAN	13AC CMS	pp at 7 TeV
1.303 ± 0.075 ± 0.035	10	ABAZOV	12U D0	$p\bar{p}$ at 1.96 TeV
1.537 ± 0.045 ± 0.014	10	AALTONEN	11 CDF	$p\bar{p}$ at 1.96 TeV
1.401 ± 0.046 ± 0.035	11	AALTONEN	10B CDF	$p\bar{p}$ at 1.96 TeV
1.290 ^{+0.119+0.087} _{-0.110-0.091}	12	ABAZOV	07U D0	$p\bar{p}$ at 1.96 TeV
1.11 ^{+0.19} _{-0.18} ± 0.05	13	ABREU	99W DLPH	$e^+e^- \rightarrow Z$
1.29 ^{+0.24} _{-0.22} ± 0.06	13	ACKERSTAFF	98G OPAL	$e^+e^- \rightarrow Z$
1.21 ± 0.11	13	BARATE	98D ALEP	$e^+e^- \rightarrow Z$
1.32 ± 0.15 ± 0.07	14	ABE	96M CDF	$p\bar{p}$ at 1.8 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1.218 ^{+0.130} _{-0.115} ± 0.042	10	ABAZOV	07S D0	Repl. by ABAZOV 12U
1.593 ^{+0.083} _{-0.078} ± 0.033	10	ABULENCIA	07A CDF	Repl. by AALTONEN 11
1.22 ^{+0.22} _{-0.18} ± 0.04	10	ABAZOV	05C D0	Repl. by ABAZOV 07S
1.19 ^{+0.21} _{-0.18} ± 0.07		ABREU	96D DLPH	Repl. by ABREU 99W
1.14 ^{+0.22} _{-0.19} ± 0.07	69	AKERS	95K OPAL	Repl. by ACKERSTAFF 98G
1.02 ^{+0.23} _{-0.18} ± 0.06	44	BUSKULIC	95L ALEP	Repl. by BARATE 98D

¹⁰ Measured mean life using fully reconstructed $\Lambda_b^0 \rightarrow J/\psi \Lambda$ decays.

¹¹ Measured mean life using fully reconstructed $\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-$ decays.

¹² Measured using semileptonic decays $\Lambda_b^0 \rightarrow \Lambda_c^+ \mu \nu X$ and $\Lambda_c^+ \rightarrow K_S^0 p$.

¹³ Measured using $\Lambda_c \ell^-$ and $\Lambda \ell^+ \ell^-$.

¹⁴ Excess $\Lambda_c \ell^-$, decay lengths.

$\tau_{\Lambda_b^0} / \tau_{\Lambda_b^-}$

VALUE	DOCUMENT ID	TECN	COMMENT
0.940 ± 0.035 ± 0.006	15 AAIJ	14E LHCb	pp at 7 TeV

¹⁵ 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
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0.955 ± 0.009 OUR EVALUATION

0.950 ± 0.023 OUR AVERAGE Error includes scale factor of 1.7. See the ideogram below.

0.929 ± 0.018 ± 0.004	¹⁶ AAIJ	14E	LHCB	pp at 7 TeV
0.960 ± 0.025 ± 0.016	¹⁷ AAD	13U	ATLS	pp at 7 TeV
0.864 ± 0.052 ± 0.033	^{18,19} ABAZOV	12U	D0	$p\bar{p}$ at 1.96 TeV
1.020 ± 0.030 ± 0.008	¹⁸ AALTONEN	11	CDF	$p\bar{p}$ at 1.96 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.976 ± 0.012 ± 0.006	²⁰ AAIJ	13BB	LHCB	pp at 7 TeV
0.811 ^{+0.096} _{-0.087} ± 0.034	^{18,19} ABAZOV	07S	D0	Repl. by ABAZOV 12U
1.041 ± 0.057	²¹ ABULENCIA	07A	CDF	Repl. by AALTONEN 11
0.87 ^{+0.17} _{-0.14} ± 0.03	²¹ ABAZOV	05C	D0	Repl. by ABAZOV 07S

¹⁶ Measured using $\Lambda_b^0 \rightarrow J/\psi \Lambda$ and $B^0 \rightarrow J/\psi K^{*0}$ decays.

¹⁷ Measured with $\Lambda_b^0 \rightarrow J/\psi(\mu^+ \mu^-) \Lambda^0(p\pi^-)$ decays.

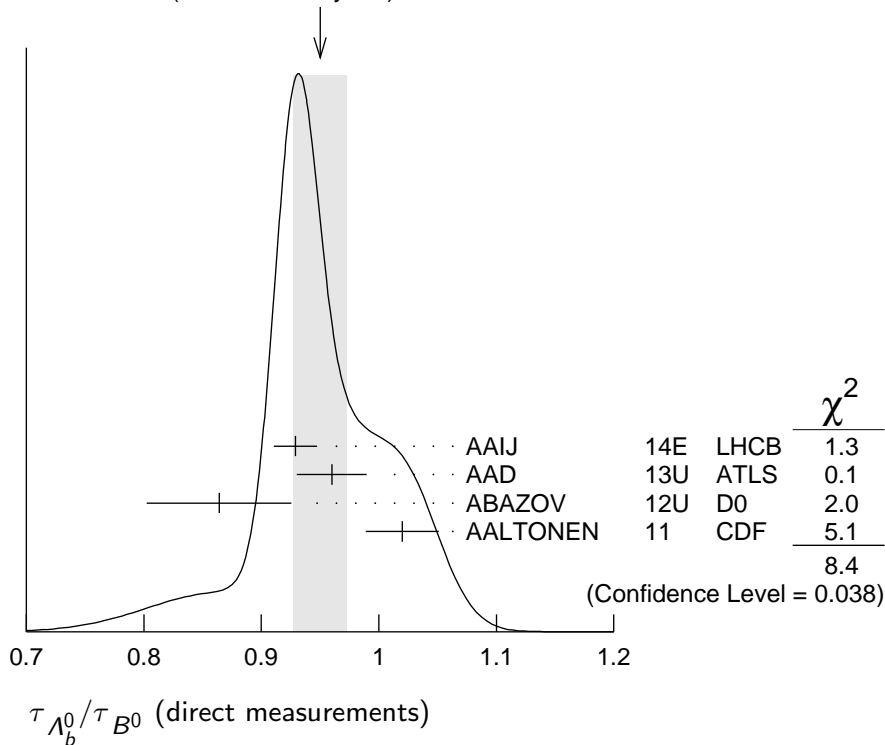
¹⁸ Uses fully reconstructed $\Lambda_b \rightarrow J/\psi \Lambda$ decays.

¹⁹ Uses $B^0 \rightarrow J/\psi K_S^0$ decays for denominator.

²⁰ 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.

²¹ Measured mean life ratio using fully reconstructed decays.

WEIGHTED AVERAGE
0.950 ± 0.023 (Error scaled by 1.7)



Λ_b^0 DECAY MODES

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

For inclusive branching fractions, e.g., $\Lambda_b \rightarrow \bar{\Lambda}_c \text{ anything}$, 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 $J/\psi(1S)\Lambda \times B(b \rightarrow \Lambda_b^0)$	$(5.8 \pm 0.8) \times 10^{-5}$	
Γ_2 $pD^0\pi^-$	$(5.9 \begin{smallmatrix} +4.0 \\ -3.2 \end{smallmatrix}) \times 10^{-4}$	
Γ_3 pD^0K^-	$(4.3 \begin{smallmatrix} +3.0 \\ -2.4 \end{smallmatrix}) \times 10^{-5}$	
Γ_4 $\Lambda_c^+\pi^-$	$(5.7 \begin{smallmatrix} +4.0 \\ -2.6 \end{smallmatrix}) \times 10^{-3}$	S=1.6
Γ_5 $\Lambda_c^+K^-$	$(4.2 \begin{smallmatrix} +2.6 \\ -1.9 \end{smallmatrix}) \times 10^{-4}$	
Γ_6 $\Lambda_c^+a_1(1260)^-$	seen	
Γ_7 $\Lambda_c^+\pi^+\pi^-\pi^-$	$(8 \begin{smallmatrix} +5 \\ -4 \end{smallmatrix}) \times 10^{-3}$	S=1.6
Γ_8 $\Lambda_c(2595)^+\pi^-$, $\Lambda_c(2595)^+ \rightarrow \Lambda_c^+\pi^+\pi^-$	$(3.7 \begin{smallmatrix} +2.8 \\ -2.3 \end{smallmatrix}) \times 10^{-4}$	
Γ_9 $\Lambda_c(2625)^+\pi^-$, $\Lambda_c(2625)^+ \rightarrow \Lambda_c^+\pi^+\pi^-$	$(3.6 \begin{smallmatrix} +2.7 \\ -2.1 \end{smallmatrix}) \times 10^{-4}$	
Γ_{10} $\Sigma_c(2455)^0\pi^+\pi^-$, $\Sigma_c^0 \rightarrow \Lambda_c^+\pi^-$	$(6 \begin{smallmatrix} +5 \\ -4 \end{smallmatrix}) \times 10^{-4}$	
Γ_{11} $\Sigma_c(2455)^{++}\pi^-\pi^-$, $\Sigma_c^{++} \rightarrow \Lambda_c^+\pi^+$	$(3.5 \begin{smallmatrix} +2.8 \\ -2.3 \end{smallmatrix}) \times 10^{-4}$	
Γ_{12} $\Lambda K^0 2\pi^+ 2\pi^-$		
Γ_{13} $\Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything}$	[a] $(9.9 \pm 2.2) \%$	
Γ_{14} $\Lambda_c^+ \ell^- \bar{\nu}_\ell$	$(6.5 \begin{smallmatrix} +3.2 \\ -2.5 \end{smallmatrix}) \%$	S=1.8
Γ_{15} $\Lambda_c^+ \pi^+ \pi^- \ell^- \bar{\nu}_\ell$	$(5.6 \pm 3.1) \%$	
Γ_{16} $\Lambda_c(2595)^+ \ell^- \bar{\nu}_\ell$	$(8 \pm 5) \times 10^{-3}$	
Γ_{17} $\Lambda_c(2625)^+ \ell^- \bar{\nu}_\ell$	$(1.4 \begin{smallmatrix} +0.9 \\ -0.7 \end{smallmatrix}) \%$	
Γ_{18} $\Sigma_c(2455)^0 \pi^+ \ell^- \bar{\nu}_\ell$		
Γ_{19} $\Sigma_c(2455)^{++} \pi^- \ell^- \bar{\nu}_\ell$		
Γ_{20} $p h^-$	[b] $< 2.3 \times 10^{-5}$	CL=90%

Γ_{21}	$\rho\pi^-$	$(4.1 \pm 0.8) \times 10^{-6}$	
Γ_{22}	ρK^-	$(4.9 \pm 0.9) \times 10^{-6}$	
Γ_{23}	$\Lambda\mu^+\mu^-$	$(1.08 \pm 0.28) \times 10^{-6}$	
Γ_{24}	$\Lambda\gamma$	$< 1.3 \times 10^{-3}$	CL=90%

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

[b] Here h^- means π^- or K^- .

CONSTRAINED FIT INFORMATION

An overall fit to 8 branching ratios uses 8 measurements and one constraint to determine 6 parameters. The overall fit has a $\chi^2 = 4.5$ for 3 degrees of freedom.

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

x_7	93			
x_{14}	14	13		
x_{21}	0	0	0	
x_{22}	0	0	0	84
	x_4	x_7	x_{14}	x_{21}

Λ_b^0 BRANCHING RATIOS

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

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
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5.8 ± 0.8 OUR AVERAGE

$6.01 \pm 0.60 \pm 0.58 \pm 0.28$	22	ABAZOV	110 D0	$\rho\bar{p}$ at 1.96 TeV
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$4.7 \pm 2.3 \pm 0.2$	23	ABE	97B CDF	$\rho\bar{p}$ at 1.8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

180 ±60 ±90	16	ALBAJAR	91E UA1	$\rho\bar{p}$ at 630 GeV
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²²ABAZOV 110 uses $B(B^0 \rightarrow J/\psi K_S^0) \times B(b \rightarrow B^0) = (1.74 \pm 0.08) \times 10^{-4}$ to obtain the result. The $(\pm 0.08) \times 10^{-4}$ uncertainty of this product is listed as the last uncertainty of the measurement, $(\pm 0.28) \times 10^{-5}$.

²³ABE 97B reports $[B(\Lambda_b^0 \rightarrow J/\psi \Lambda) \times B(b \rightarrow \Lambda_b^0)] / [B(B^0 \rightarrow J/\psi K_S^0) \times B(b \rightarrow B^0)] = 0.27 \pm 0.12 \pm 0.05$. We multiply by our best value $B(B^0 \rightarrow J/\psi K_S^0) \times B(b \rightarrow B^0) = (1.74 \pm 0.08) \times 10^{-4}$. Our first error is their experiment error and our second error is the systematic error from using our best value.

$\Gamma(\rho D^0 \pi^-) / \Gamma_{\text{total}}$ Γ_2/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

seen	52	BARI	91 SFM	$D^0 \rightarrow K^- \pi^+$
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seen		BASILE	81 SFM	$D^0 \rightarrow K^- \pi^+$
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$\Gamma(\rho D^0 K^-)/\Gamma(\rho D^0 \pi^-)$ Γ_3/Γ_2

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
$7.3 \pm 0.8^{+0.5}_{-0.6}$	AAIJ	14H	LHCB pp at 7 TeV

$\Gamma(\Lambda_c^+ \pi^-)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$5.7^{+4.0}_{-2.6}$ OUR FIT				Error includes scale factor of 1.6.

$8.8 \pm 2.8 \pm 1.5$ ²⁴ ABULENCIA 07B CDF $p\bar{p}$ at 1.96 TeV

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

seen	3	ABREU	96N	DLPH $\Lambda_c^+ \rightarrow pK^- \pi^+$
seen	4	BUSKULIC	96L	ALEP $\Lambda_c^+ \rightarrow pK^- \pi^+$, $\rho\bar{K}^0, \Lambda\pi^+ \pi^+ \pi^-$

²⁴ The result is obtained from $(f_{\text{baryon}}/f_d) (B(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-)/B(\bar{B}^0 \rightarrow D^+ \pi^-)) = 0.82 \pm 0.08 \pm 0.11 \pm 0.22$, assuming $f_{\text{baryon}}/f_d = 0.25 \pm 0.04$ and $B(\bar{B}^0 \rightarrow D^+ \pi^-) = (2.68 \pm 0.13) \times 10^{-3}$.

$\Gamma(\rho D^0 \pi^-)/\Gamma(\Lambda_c^+ \pi^-)$ Γ_2/Γ_4

VALUE	DOCUMENT ID	TECN	COMMENT
$0.104 \pm 0.005 \pm 0.027$	²⁵ AAIJ	14H	LHCB pp at 7 TeV

²⁵ AAIJ 14H reports $[\Gamma(\Lambda_b^0 \rightarrow \rho D^0 \pi^-)/\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-)] \times [B(D^0 \rightarrow K^- \pi^+)] / [B(\Lambda_c^+ \rightarrow pK^- \pi^+)] = (8.06 \pm 0.23 \pm 0.35) \times 10^{-2}$ which we multiply or divide by our best values $B(D^0 \rightarrow K^- \pi^+) = (3.88 \pm 0.05) \times 10^{-2}$, $B(\Lambda_c^+ \rightarrow pK^- \pi^+) = (5.0 \pm 1.3) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(\Lambda_c^+ K^-)/\Gamma(\Lambda_c^+ \pi^-)$ Γ_5/Γ_4

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
$7.31 \pm 0.16 \pm 0.16$	AAIJ	14H	LHCB pp at 7 TeV

$\Gamma(\Lambda_c^+ a_1(1260)^-)/\Gamma_{\text{total}}$ Γ_6/Γ

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

$\Gamma(\Lambda_c^+ \pi^+ \pi^- \pi^-)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
8^{+5}_{-4} OUR FIT				Error includes scale factor of 1.6.

$17 \pm 4^{+11}_{-8}$ ²⁶ AALTONEN 12A CDF $p\bar{p}$ at 1.96 TeV

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

seen	90	BARI	91	SFM $\Lambda_c^+ \rightarrow pK^- \pi^+$
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²⁶ AALTONEN 12A reports $[\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^+ \pi^- \pi^-) / \Gamma_{\text{total}}] / [B(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-)] = 3.04 \pm 0.33^{+0.70}_{-0.55}$ which we multiply by our best value $B(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^-) = (5.7^{+4.0}_{-2.6}) \times 10^{-3}$. 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_7 / Γ_4

VALUE	DOCUMENT ID	TECN	COMMENT
1.46 ± 0.22 OUR FIT	Error includes scale factor of 1.1.		
1.43 ± 0.16 ± 0.13	AAIJ	11E	LHCB pp at 7 TeV

$\Gamma(\Lambda_c(2595)^+ \pi^-, \Lambda_c(2595)^+ \rightarrow \Lambda_c^+ \pi^+ \pi^-) / \Gamma(\Lambda_c^+ \pi^+ \pi^- \pi^-)$ Γ_8 / Γ_7

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
4.4 ± 1.7^{+0.6}_{-0.4}	AAIJ	11E	LHCB pp at 7 TeV

$\Gamma(\Lambda_c(2625)^+ \pi^-, \Lambda_c(2625)^+ \rightarrow \Lambda_c^+ \pi^+ \pi^-) / \Gamma(\Lambda_c^+ \pi^+ \pi^- \pi^-)$ Γ_9 / Γ_7

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

$\Gamma(\Sigma_c(2455)^0 \pi^+ \pi^-, \Sigma_c^0 \rightarrow \Lambda_c^+ \pi^-) / \Gamma(\Lambda_c^+ \pi^+ \pi^- \pi^-)$ Γ_{10} / Γ_7

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

$\Gamma(\Sigma_c(2455)^{++} \pi^- \pi^-, \Sigma_c^{++} \rightarrow \Lambda_c^+ \pi^+) / \Gamma(\Lambda_c^+ \pi^+ \pi^- \pi^-)$ Γ_{11} / Γ_7

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

$\Gamma(\Lambda K^0 2\pi^+ 2\pi^-) / \Gamma_{\text{total}}$ Γ_{12} / Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

seen 4 ²⁷ ARENTON 86 FMPS $\Lambda K_S^0 2\pi^+ 2\pi^-$

²⁷ See the footnote to the ARENTON 86 mass value.

$\Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything}) / \Gamma_{\text{total}}$ Γ_{13} / Γ

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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0.099 ± 0.022 OUR AVERAGE

0.093 ± 0.017 ± 0.015 28 BARATE 98D ALEP $e^+ e^- \rightarrow Z$

0.13 ± 0.04 ± 0.02 29 29 ABREU 95S DLPH $e^+ e^- \rightarrow Z$

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

0.082 ± 0.020 ± 0.013 55 30 BUSKULIC 95L ALEP Repl. by BARATE 98D

0.16 ± 0.06 ± 0.03 21 31 BUSKULIC 92E ALEP $\Lambda_c^+ \rightarrow p K^- \pi^+$

- ²⁸ BARATE 98D reports $[\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything})/\Gamma_{\text{total}}] \times [B(\bar{b} \rightarrow b\text{-baryon})] = 0.0086 \pm 0.0007 \pm 0.0014$ which we divide by our best value $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$. 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 $\Lambda \ell^+ \ell^-$.
- ²⁹ ABREU 95S reports $[\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything})/\Gamma_{\text{total}}] \times [B(\bar{b} \rightarrow b\text{-baryon})] = 0.0118 \pm 0.0026^{+0.0031}_{-0.0021}$ which we divide by our best value $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³⁰ BUSKULIC 95L reports $[\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything})/\Gamma_{\text{total}}] \times [B(\bar{b} \rightarrow b\text{-baryon})] = 0.00755 \pm 0.0014 \pm 0.0012$ which we divide by our best value $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³¹ BUSKULIC 92E reports $[\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \bar{\nu}_\ell \text{ anything})/\Gamma_{\text{total}}] \times [B(\bar{b} \rightarrow b\text{-baryon})] = 0.015 \pm 0.0035 \pm 0.0045$ which we divide by our best value $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$. 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.

$\Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell)/\Gamma_{\text{total}}$					Γ_{14}/Γ
VALUE	DOCUMENT ID	TECN	COMMENT		
0.065^{+0.032}_{-0.025} OUR FIT				Error includes scale factor of 1.8.	

0.050^{+0.011+0.016}_{-0.008-0.012}	³² ABDALLAH	04A	DLPH	$e^+ e^- \rightarrow Z^0$	
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³² Derived from a combined likelihood and event rate fit to the distribution of the $\ln g_{\text{cur}}$ variable and using HQET. The slope of the form factor is measured to be $\rho^2 = 2.03 \pm 0.46^{+0.72}_{-1.00}$.

$\Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell)/\Gamma(\Lambda_c^+ \pi^-)$					Γ_{14}/Γ_4
VALUE	DOCUMENT ID	TECN	COMMENT		
11⁺⁴₋₅ OUR FIT				Error includes scale factor of 1.2.	

16.6\pm3.0^{+2.8}_{-3.6}	AALTONEN	09E	CDF	$p\bar{p}$ at 1.96 TeV	
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$\Gamma(\Lambda_c^+ \pi^+ \pi^- \ell^- \bar{\nu}_\ell)/\Gamma_{\text{total}}$					Γ_{15}/Γ
VALUE	DOCUMENT ID	TECN	COMMENT		
0.056^{+0.031}_{-0.030}	³³ ABDALLAH	04A	DLPH	$e^+ e^- \rightarrow Z^0$	

³³ Derived from the fraction of $\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \bar{\nu}_\ell) / (\Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \ell^- \bar{\nu}_\ell) + \Gamma(\Lambda_b^0 \rightarrow \Lambda_c^+ \pi^+ \pi^- \ell^- \bar{\nu}_\ell)) = 0.47^{+0.10+0.07}_{-0.08-0.06}$.

$\Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell)/[\Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell) + \Gamma(\Lambda_c^+ \pi^+ \pi^- \ell^- \bar{\nu}_\ell)]$					$\Gamma_{14}/(\Gamma_{14}+\Gamma_{15})$
VALUE	DOCUMENT ID	TECN	COMMENT		
0.47^{+0.10+0.07}_{-0.08-0.06}	ABDALLAH	04A	DLPH	$e^+ e^- \rightarrow Z^0$	

$\Gamma(\Lambda_c(2595)^+ \ell^- \bar{\nu}_\ell)/\Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell)$					Γ_{16}/Γ_{14}
VALUE	DOCUMENT ID	TECN	COMMENT		
0.126\pm0.033^{+0.047}_{-0.038}	AALTONEN	09E	CDF	$p\bar{p}$ at 1.96 TeV	

$\Gamma(\Lambda_c(2625)^+ \ell^- \bar{\nu}_\ell) / \Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell)$ $\Gamma_{17} / \Gamma_{14}$

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

$[\frac{1}{2}\Gamma(\Sigma_c(2455)^0 \pi^+ \ell^- \bar{\nu}_\ell) + \frac{1}{2}\Gamma(\Sigma_c(2455)^{++} \pi^- \ell^- \bar{\nu}_\ell)] / \Gamma(\Lambda_c^+ \ell^- \bar{\nu}_\ell)$
 $(\frac{1}{2}\Gamma_{18} + \frac{1}{2}\Gamma_{19}) / \Gamma_{14}$

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

$\Gamma(p h^-) / \Gamma_{\text{total}}$ Γ_{20} / Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$< 2.3 \times 10^{-5}$	90	³⁴ ACOSTA 050	CDF	$p\bar{p}$ at 1.96 TeV

³⁴ Assumes $f_\Lambda / f_d = 0.25$, and equal momentum distribution for Λ_b and B mesons.

$\Gamma(p\pi^-) / \Gamma_{\text{total}}$ Γ_{21} / Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
4.1 ± 0.8 OUR FIT				
3.6 ± 0.8 ± 0.6		³⁵ AALTONEN 09C	CDF	$p\bar{p}$ at 1.96 TeV

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

<50	90	³⁶ BUSKULIC 96V	ALEP	$e^+ e^- \rightarrow Z$
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³⁵ AALTONEN 09C reports $[\Gamma(\Lambda_b^0 \rightarrow p\pi^-) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow K^+\pi^-)] \times [B(\bar{b} \rightarrow b\text{-baryon})] / [B(\bar{b} \rightarrow B^0)] = 0.042 \pm 0.007 \pm 0.006$ which we multiply or divide by our best values $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$, $B(\bar{b} \rightarrow B^0) = (40.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

³⁶ BUSKULIC 96V assumes PDG 96 production fractions for B^0 , B^+ , B_s , b baryons.

$\Gamma(pK^-) / \Gamma_{\text{total}}$ Γ_{22} / Γ

VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT
4.9 ± 0.9 OUR FIT				
5.6 ± 1.0 ± 0.9		³⁷ AALTONEN 09C	CDF	$p\bar{p}$ at 1.96 TeV

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

<360	90	³⁸ ADAM 96D	DLPH	$e^+ e^- \rightarrow Z$
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< 50	90	³⁹ BUSKULIC 96V	ALEP	$e^+ e^- \rightarrow Z$
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³⁷ AALTONEN 09C reports $[\Gamma(\Lambda_b^0 \rightarrow pK^-) / \Gamma_{\text{total}}] / [B(B^0 \rightarrow K^+\pi^-)] \times [B(\bar{b} \rightarrow b\text{-baryon})] / [B(\bar{b} \rightarrow B^0)] = 0.066 \pm 0.009 \pm 0.008$ which we multiply or divide by our best values $B(B^0 \rightarrow K^+\pi^-) = (1.96 \pm 0.05) \times 10^{-5}$, $B(\bar{b} \rightarrow b\text{-baryon}) = (9.2 \pm 1.5) \times 10^{-2}$, $B(\bar{b} \rightarrow B^0) = (40.2 \pm 0.7) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

³⁸ ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$.

³⁹ BUSKULIC 96V assumes PDG 96 production fractions for B^0 , B^+ , B_s , b baryons.

$\Gamma(p\pi^-) / \Gamma(pK^-)$ $\Gamma_{21} / \Gamma_{22}$

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

$\Gamma(\Lambda\mu^+\mu^-)/\Gamma_{\text{total}}$ **Γ_{23}/Γ**

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
10.8 ± 2.8 OUR AVERAGE			
9.6 ± 1.6 ± 2.5	40 AAIJ	13AJ LHCB	pp at 7 TeV
17.3 ± 4.2 ± 5.5	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
40 Uses $B(\Lambda_b^0 \rightarrow J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			

$\Gamma(\Lambda\gamma)/\Gamma_{\text{total}}$ **Γ_{24}/Γ**

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 1.3 × 10⁻³	90	ACOSTA	02G CDF	$p\bar{p}$ at 1.8 TeV

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

$B(\Lambda_b \rightarrow \Lambda\mu^+\mu^-) (q^2 < 2.0 \text{ GeV}^2/c^4)$

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.3 ± 0.5 OUR AVERAGE			
0.28 ± 0.38 ± 0.40	41 AAIJ	13AJ LHCB	pp at 7 TeV
0.15 ± 2.01 ± 0.05	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
41 Uses $B(\Lambda_b^0 \rightarrow J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			

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

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.34 ± 0.28 OUR AVERAGE			
0.31 ± 0.26 ± 0.10	42 AAIJ	13AJ LHCB	pp at 7 TeV
1.8 ± 1.7 ± 0.6	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
42 Uses $B(\Lambda_b^0 \rightarrow J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			

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

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.15 ± 0.17 OUR AVERAGE			
0.15 ± 0.17 ± 0.04	43 AAIJ	13AJ LHCB	pp at 7 TeV
-0.2 ± 1.6 ± 0.1	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
43 Uses $B(\Lambda_b^0 \rightarrow J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			

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

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.62 ± 0.29 OUR AVERAGE			
0.56 ± 0.21 ± 0.20	44 AAIJ	13AJ LHCB	pp at 7 TeV
3.0 ± 1.5 ± 1.0	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
44 Uses $B(\Lambda_b^0 \rightarrow J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			

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

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.82 ± 0.30 OUR AVERAGE			
0.79 ± 0.24 ± 0.23	45 AAIJ	13AJ LHCB	pp at 7 TeV
1.0 ± 0.7 ± 0.3	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
45 Uses $B(\Lambda_b^0 \rightarrow J/\psi\Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			

$B(\Lambda_b \rightarrow \Lambda \mu^+ \mu^-) (16.0 < q^2 < 20.30 \text{ GeV}^2/c^4)$

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.18 ± 0.34 OUR AVERAGE			
$1.10 \pm 0.18 \pm 0.29$	^{46,47} AAIJ	13AJ LHCB	pp at 7 TeV
$7.0 \pm 1.9 \pm 2.2$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV
⁴⁶ Uses $B(\Lambda_b^0 \rightarrow J/\psi \Lambda) = (6.2 \pm 1.4) \times 10^{-4}$.			
⁴⁷ Requires $16.00 < q^2 < 20.30 \text{ GeV}^2/c^4$.			

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

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$1.3 \pm 2.1 \pm 0.4$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV

 $B(\Lambda_b \rightarrow \Lambda \mu^+ \mu^-) (0.0 < q^2 < 4.3 \text{ GeV}^2/c^4)$

<u>VALUE (units 10^{-7})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$2.7 \pm 2.5 \pm 0.9$	AALTONEN	11AI CDF	$p\bar{p}$ at 1.96 TeV

CP VIOLATION

A_{CP} is defined as

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

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.03 \pm 0.17 \pm 0.05$	AALTONEN	11N CDF	$p\bar{p}$ at 1.96 TeV

 $A_{CP}(\Lambda_b \rightarrow pK^-)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.37 \pm 0.17 \pm 0.03$	AALTONEN	11N CDF	$p\bar{p}$ at 1.96 TeV

 Λ_b^0 DECAY PARAMETERS

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.05 \pm 0.17 \pm 0.07$	⁴⁸ AAIJ	13AG LHCB	pp at 7 TeV

⁴⁸ An angular analysis of $\Lambda_b \rightarrow J/\psi \Lambda$ decay is performed and a Λ_b transverse production polarization of $0.06 \pm 0.07 \pm 0.02$ is also reported.

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