



$$I(J^P) = 0(0^-)$$

I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

B_c^\pm MASS

VALUE (GeV)	DOCUMENT ID	TECN	COMMENT
6.276 ± 0.004 OUR AVERAGE			
6.2756 ± 0.0029 ± 0.0025	¹ AALTONEN	08M CDF	$\rho\bar{p}$ at 1.96 TeV
6.4 ± 0.39 ± 0.13	² ABE	98M CDF	$\rho\bar{p}$ at 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
6.2857 ± 0.0053 ± 0.0012	¹ ABULENCIA	06C CDF	Repl. by AALTONEN 08M
6.32 ± 0.06	³ ACKERSTAFF	98O OPAL	$e^+e^- \rightarrow Z$

¹ Measured using a fully reconstructed decay mode of $B_c \rightarrow J/\psi\pi$.

² ABE 98M observed $20.4^{+6.2}_{-5.5}$ events in the $B_c^+ \rightarrow J/\psi(1S)\ell\nu_\ell$ with a significance of > 4.8 standard deviations. The mass value is estimated from $m(J/\psi(1S)\ell)$.

³ ACKERSTAFF 98O observed 2 candidate events in the $B_c \rightarrow J/\psi(1S)\pi^+$ channel with an estimated background of 0.63 ± 0.20 events.

B_c^\pm MEAN LIFE

VALUE (10^{-12} s)	DOCUMENT ID	TECN	COMMENT
0.46 ± 0.07 OUR AVERAGE			
0.463 ^{+0.073} _{-0.065} ± 0.036	⁴ ABULENCIA	06O CDF	$\rho\bar{p}$ at 1.96 TeV
0.46 ^{+0.18} _{-0.16} ± 0.03	⁴ ABE	98M CDF	$\rho\bar{p}$ 1.8 TeV

⁴ The lifetime is measured from the $J/\psi(1S)e$ decay vertices.

B_c^+ DECAY MODES × $B(\bar{b} \rightarrow B_c)$

B_c^- modes are charge conjugates of the modes below.

Mode	Fraction (Γ_i/Γ)	Confidence level
The following quantities are not pure branching ratios; rather the fraction $\Gamma_i/\Gamma \times B(\bar{b} \rightarrow B_c)$.		
Γ_1 $J/\psi(1S)\ell^+\nu_\ell$ anything	$(5.2^{+2.4}_{-2.1}) \times 10^{-5}$	
Γ_2 $J/\psi(1S)\pi^+$	$< 8.2 \times 10^{-5}$	90%
Γ_3 $J/\psi(1S)\pi^+\pi^+\pi^-$	$< 5.7 \times 10^{-4}$	90%
Γ_4 $J/\psi(1S)a_1(1260)$	$< 1.2 \times 10^{-3}$	90%
Γ_5 $D^*(2010)^+\bar{D}^0$	$< 6.2 \times 10^{-3}$	90%

B_c^+ BRANCHING RATIOS

$\Gamma(J/\psi(1S)\ell^+\nu_\ell \text{ anything})/\Gamma_{\text{total}} \times B(\bar{b} \rightarrow B_c)$ $\Gamma_1/\Gamma \times B$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$(5.2^{+2.4}_{-2.1}) \times 10^{-5}$		⁵ ABE	98M CDF	$p\bar{p}$ 1.8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 1.6 \times 10^{-4}$	90	⁶ ACKERSTAFF	98O OPAL	$e^+e^- \rightarrow Z$
$< 1.9 \times 10^{-4}$	90	⁷ ABREU	97E DLPH	$e^+e^- \rightarrow Z$
$< 1.2 \times 10^{-4}$	90	⁸ BARATE	97H ALEP	$e^+e^- \rightarrow Z$

⁵ ABE 98M result is derived from the measurement of $[\sigma(B_c) \times B(B_c \rightarrow J/\psi(1S)\ell\nu_\ell)] / [\sigma(B^+) \times B(B^+ \rightarrow J/\psi(1S)K^+)] = 0.132^{+0.041}_{-0.037}(\text{stat}) \pm 0.031(\text{sys})^{+0.032}_{-0.020}(\text{lifetime})$ by using PDG 98 values of $B(b \rightarrow B^+)$ and $B(B^+ \rightarrow J/\psi(1S)K^+)$.

⁶ ACKERSTAFF 98O reports $B(Z \rightarrow B_c X)/B(Z \rightarrow qq) \times B(B_c \rightarrow J/\psi(1S)\ell\nu_\ell) < 6.95 \times 10^{-5}$ at 90%CL. We rescale to our PDG 98 values of $B(Z \rightarrow b\bar{b})$.

⁷ ABREU 97E value listed is for an assumed $\tau_{B_c} = 0.4$ ps and improves to 1.6×10^{-4} for $\tau_{B_c} = 1.4$ ps.

⁸ BARATE 97H reports $B(Z \rightarrow B_c X)/B(Z \rightarrow qq) \cdot B(B_c \rightarrow J/\psi(1S)\ell\nu_\ell) < 5.2 \times 10^{-5}$ at 90%CL. We rescale to our PDG 96 values of $B(Z \rightarrow b\bar{b})$. A $B_c^+ \rightarrow J/\psi(1S)\mu^+\nu_\mu$ candidate event is found, compared to all the known background sources 2×10^{-3} , which gives $m_{B_c} = 5.96^{+0.25}_{-0.19}$ GeV and $\tau_{B_c} = 1.77 \pm 0.17$ ps.

$\Gamma(J/\psi(1S)\pi^+)/\Gamma_{\text{total}} \times B(\bar{b} \rightarrow B_c)$ $\Gamma_2/\Gamma \times B$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$< 8.2 \times 10^{-5}$	90	⁹ BARATE	97H ALEP	$e^+e^- \rightarrow Z$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$< 2.4 \times 10^{-4}$	90	¹⁰ ACKERSTAFF	98O OPAL	$e^+e^- \rightarrow Z$
$< 3.4 \times 10^{-4}$	90	¹¹ ABREU	97E DLPH	$e^+e^- \rightarrow Z$
$< 2.0 \times 10^{-5}$	95	¹² ABE	96R CDF	$p\bar{p}$ 1.8 TeV

⁹ BARATE 97H reports $B(Z \rightarrow B_c X)/B(Z \rightarrow qq) \cdot B(B_c \rightarrow J/\psi(1S)\pi) < 3.6 \times 10^{-5}$ at 90%CL. We rescale to our PDG 96 values of $B(Z \rightarrow b\bar{b})$.

¹⁰ ACKERSTAFF 98O reports $B(Z \rightarrow B_c X)/B(Z \rightarrow qq) \times B(B_c \rightarrow J/\psi(1S)\pi^+) < 1.06 \times 10^{-4}$ at 90%CL. We rescale to our PDG 98 values of $B(Z \rightarrow b\bar{b})$.

¹¹ ABREU 97E value listed is for an assumed $\tau_{B_c} = 0.4$ ps and improves to 2.7×10^{-4} for $\tau_{B_c} = 1.4$ ps.

¹² ABE 96R reports $B(b \rightarrow B_c X)/B(b \rightarrow B^+ X) \cdot B(B_c^+ \rightarrow J/\psi(1S)\pi^+)/B(B^+ \rightarrow J/\psi(1S)K^+) < 0.053$ at 95%CL for $\tau_{B_c} = 0.8$ ps. It changes from 0.15 to 0.04 for $0.17 \text{ ps} < \tau_{B_c} < 1.6$ ps. We rescale to our PDG 96 values of $B(b \rightarrow B^+) = 0.378 \pm 0.022$ and $B(B^+ \rightarrow J/\psi(1S)K^+) = 0.00101 \pm 0.00014$.

$\Gamma(J/\psi(1S)\pi^+\pi^+\pi^-)/\Gamma_{\text{total}} \times B(\bar{b} \rightarrow B_c)$ $\Gamma_3/\Gamma \times B$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
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$< 5.7 \times 10^{-4}$	90	¹³ ABREU	97E DLPH	$e^+e^- \rightarrow Z$
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¹³ ABREU 97E value listed is independent of $0.4 \text{ ps} < \tau_{B_c} < 1.4$ ps.

$\Gamma(J/\psi(1S)a_1(1260))/\Gamma_{\text{total}} \times B(\bar{b} \rightarrow B_c) \quad \Gamma_4/\Gamma \times B$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<1.2 \times 10^{-3}$	90	¹⁴ ACKERSTAFF 98O	OPAL	$e^+e^- \rightarrow Z$

¹⁴ ACKERSTAFF 98O reports $B(Z \rightarrow B_c X)/B(Z \rightarrow qq) \times B(B_c \rightarrow J/\psi(1S)a_1(1260)) < 5.29 \times 10^{-4}$ at 90%CL. We rescale to our PDG 98 values of $B(Z \rightarrow b\bar{b})$.

$\Gamma(D^*(2010)^+\bar{D}^0)/\Gamma_{\text{total}} \times B(\bar{b} \rightarrow B_c) \quad \Gamma_5/\Gamma \times B$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<6.2 \times 10^{-3}$	90	¹⁵ BARATE 98Q	ALEP	$e^+e^- \rightarrow Z$

¹⁵ BARATE 98Q reports $B(Z \rightarrow B_c X) \times B(B_c \rightarrow D^*(2010)^+\bar{D}^0) < 1.9 \times 10^{-3}$ at 90%CL. We rescale to our PDG 98 values of $B(Z \rightarrow b\bar{b})$.

B_c^\pm REFERENCES

AALTONEN 08M	PRL 100 182002	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABULENCIA 06C	PRL 96 082002	A. Abulencia <i>et al.</i>	(CDF Collab.)
ABULENCIA 06O	PRL 97 012002	A. Abulencia <i>et al.</i>	(CDF Collab.)
ABE 98M	PRL 81 2432	F. Abe <i>et al.</i>	(CDF Collab.)
Also	PR D58 112004	F. Abe <i>et al.</i>	(CDF Collab.)
ACKERSTAFF 98O	PL B420 157	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
BARATE 98Q	EPJ C4 387	R. Barate <i>et al.</i>	(ALEPH Collab.)
PDG 98	EPJ C3 1	C. Caso <i>et al.</i>	
ABREU 97E	PL B398 207	P. Abreu <i>et al.</i>	(DELPHI Collab.)
BARATE 97H	PL B402 213	R. Barate <i>et al.</i>	(ALEPH Collab.)
ABE 96R	PRL 77 5176	F. Abe <i>et al.</i>	(CDF Collab.)
PDG 96	PR D54 1	R. M. Barnett <i>et al.</i>	