



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

I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

B_c^\pm MASS

VALUE (GeV)	DOCUMENT ID	TECN	COMMENT
$6.4 \pm 0.39 \pm 0.13$	¹ ABE	98M CDF	$p\bar{p}$ 1.8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
6.32 ± 0.06	² ACKERSTAFF 98O OPAL		$e^+e^- \rightarrow Z$
¹ 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 $m(J/\psi(1S)\ell)$.			
² 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
$0.46^{+0.18}_{-0.16} \pm 0.03$	³ ABE	98M CDF	$p\bar{p}$ 1.8 TeV
³ The lifetime is measured from the $J/\psi(1S)\ell$ decay vertices.			

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

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
$(5.2^{+2.4}_{-2.1}) \times 10^{-5}$		⁴ ABE	98M CDF	$p\bar{p}$ 1.8 TeV

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

< 1.6	$\times 10^{-4}$	90	⁵ ACKERSTAFF	98O OPAL	$e^+ e^- \rightarrow Z$
< 1.9	$\times 10^{-4}$	90	⁶ ABREU	97E DLPH	$e^+ e^- \rightarrow Z$
< 1.2	$\times 10^{-4}$	90	⁷ BARATE	97H ALEP	$e^+ e^- \rightarrow Z$

⁴ ABE 98M result is derived from the measurement of $[\sigma(B_c) \times B(B_c \rightarrow J/\psi(1S) \ell \nu_\ell)] / [\sigma(B^+) \times B(B^+ \rightarrow J/\psi(1S) K^+)] = 0.132_{-0.037}^{+0.041}(\text{stat}) \pm 0.031(\text{sys})_{-0.020}^{+0.032}(\text{lifetime})$

by using PDG 98 values of $B(b \rightarrow B^+)$ and $B(B^+ \rightarrow J/\psi(1S) K^+)$.

⁵ 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 $B(Z \rightarrow b\bar{b})$.

⁶ 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.

⁷ 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 $m_{B_c} = 5.96_{-0.19}^{+0.25}$ 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
< 8.2×10^{-5}	90	⁸ BARATE	97H ALEP	$e^+ e^- \rightarrow Z$

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

< 2.4×10^{-4}	90	⁹ ACKERSTAFF	98O OPAL	$e^+ e^- \rightarrow Z$
< 3.4×10^{-4}	90	¹⁰ ABREU	97E DLPH	$e^+ e^- \rightarrow Z$
< 2.0×10^{-5}	95	¹¹ ABE	96R CDF	$p\bar{p}$ 1.8 TeV

⁸ 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 $B(Z \rightarrow b\bar{b})$.

⁹ 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 $B(Z \rightarrow b\bar{b})$.

¹⁰ 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.

¹¹ 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
< 5.7×10^{-4}	90	¹² ABREU	97E DLPH	$e^+ e^- \rightarrow Z$

¹² ABREU 97E value listed is independent of $0.4 \text{ ps} < \tau_{B_c} < 1.4$ ps.

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

$\Gamma_4/\Gamma \times B$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 1.2×10^{-3}	90	¹³ ACKERSTAFF	98O OPAL	$e^+ e^- \rightarrow Z$

¹³ 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 $B(Z \rightarrow b\bar{b})$.

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

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$<6.2 \times 10^{-3}$	90	¹⁴ BARATE	98Q ALEP	$e^+e^- \rightarrow Z$
¹⁴ 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

ABE	98M	PRL 81 2432	F. Abe <i>et al.</i>	(CDF Collab.)
Also	98R	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>	