

$B_c(2S)^\pm$

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

Quantum numbers neither measured nor confirmed.

$B_c(2S)^\pm$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
6871.2 ± 1.0 OUR AVERAGE				
6871.7 ± 1.3 ± 0.3	24	1,2 AAIJ	19Y LHCb	pp at 7, 8, 13 TeV
6870.6 ± 1.4 ± 0.3	51	3,4 SIRUNYAN	19M CMS	pp at 13 TeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
not seen		5 AAIJ	18AL LHCb	pp at 8 TeV
6842 ± 4 ± 5	57	6,7 AAD	14AQ ATLAS	pp at 7, 8 TeV

¹ AAIJ 19Y observed $B_c(2S)^+$ in the decay mode $B_c(2S)^+ \rightarrow B_c^+ \pi^+ \pi^-$ ($B_c^+ \rightarrow J/\psi \pi^+$) with 2.2 (3.2) global (local) standard deviations significance.

² AAIJ 19Y reports mass difference measurement of $M(B_c(2S)^+) - M(B_c^+) = 597.2 \pm 1.3 \pm 0.1$ MeV. We have adjusted this measurement with our best value of $M(B_c^+) = 6274.47 \pm 0.32$ MeV. The first uncertainty of the $M(B_c(2S)^+)$ value is a total of uncertainties reported by the experiment and the second one comes from our best value of $M(B_c^+)$.

³ SIRUNYAN 19M observed $B_c(2S)^+$ in the decay mode $B_c(2S)^+ \rightarrow B_c^+ \pi^+ \pi^-$ ($B_c^+ \rightarrow J/\psi \pi^+$) with 6.5 standard deviations significance.

⁴ SIRUNYAN 19M reports mass difference measurement of $M(B_c(2S)^+) - M(B_c^+) = 596.1 \pm 1.2 \pm 0.8$ MeV. We have adjusted this measurement with our best value of $M(B_c^+) = 6274.47 \pm 0.32$ MeV. The first uncertainty of the $M(B_c(2S)^+)$ value is a total of uncertainties reported by the experiment and the second one comes from our best value of $M(B_c^+)$.

⁵ AAIJ 18AL reports an upper limit on the ratio of production cross sections for $[\sigma(B_c(2S)^+)/\sigma(B_c^+)] \cdot B(B_c(2S)^+ \rightarrow B_c^+ \pi^+ \pi^-) < 0.04-0.09$ at 95% CL for the mass value reported by AAD 14AQ.

⁶ Observed in the decay mode $B_c(2S)^+ \rightarrow B_c^+ \pi^+ \pi^-$ ($B_c^+ \rightarrow J/\psi \pi^+$) with 5.2 standard deviations significance.

⁷ Might be the $B_c^*(2S)$.

$B_c(2S)^\pm$ DECAY MODES × $B(\bar{b} \rightarrow B_c(2S))$

The following quantities are not pure branching ratios; rather the fractions $\Gamma_i/\Gamma \times B(\bar{b} \rightarrow B_c(2S))$.

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad B_c^+ \pi^+ \pi^-$	seen

$B_c(2S)^\pm$ BRANCHING RATIOS

$\Gamma(B_c^+ \pi^+ \pi^-) / \Gamma_{\text{total}}$					Γ_1 / Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
seen		SIRUNYAN	19M CMS	pp at 13 TeV	
seen	57	¹ AAD	14AQ ATLS	pp at 7, 8 TeV	
not seen		² AAIJ	18AL LHCB	pp at 8 TeV	

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

¹ Observed with 5.2 standard deviations significance.

² AAIJ 18AL reports an upper limit on the ratio of production cross sections for $[\sigma(B_c(2S)^+) / \sigma(B_c^+)] \cdot B(B_c(2S)^+ \rightarrow B_c^+ \pi^+ \pi^-) < 0.04\text{--}0.09$ at 95% CL for the mass value reported by AAD 14AQ.

$B_c(2S)^\pm$ REFERENCES

AAIJ	19Y	PRL 122 232001	R. Aaij <i>et al.</i>	(LHCb Collab.)
SIRUNYAN	19M	PRL 122 132001	A.M. Sirunyan <i>et al.</i>	(CMS Collab.)
AAIJ	18AL	JHEP 1801 138	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAD	14AQ	PRL 113 212004	G. Aad <i>et al.</i>	(ATLAS Collab.)