$B_c(2S)^{\pm}$

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

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	ATLS	pp at 7, 8 TeV

[1] AAIJ 19Y observed $B_c(2S)^+$ in the decay mode $B_c(2S)^+ \to B_c^+\pi^+\pi^-$ ($B_c^+ \to J/\psi\pi^+$) 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 $B_c(2S)^+ \to B_c^+\pi^+\pi^-$ ($B_c^+ \to J/\psi\pi^+$) 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 $[\sigma(B_c(2S)^+)/\sigma(B_c^+)]\cdot B(B_c(2S)^+ \to B_c^+\pi^+\pi^-) < 0.04$–$0.09$ at 95% CL for the mass value reported by AAD 14AQ.

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

[7] Might be the $B_c^*(2S)$.

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

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

	Mode	Fraction (Γ_i/Γ)
Γ_1	$B_c^+\pi^+\pi^-$	seen

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

$\Gamma(B_c^+\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen		SIRUNYAN	19M	CMS	pp at 13 TeV
seen	57	[1] AAD	14AQ	ATLS	pp at 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[2] AAIJ	18AL	LHCB	pp at 8 TeV

[1] Observed with 5.2 standard deviations significance.

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

$B_c(2S)^{\pm}$ REFERENCES

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