

# $B_c(2S)^\pm$

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

Quantum numbers neither measured nor confirmed.

## $B_c(2S)^\pm$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>6871.2 ± 1.0 OUR AVERAGE</b>				
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

<sup>1</sup> 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.

<sup>2</sup> 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  $M(B_c^+)$ .

<sup>3</sup> 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.

<sup>4</sup> 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  $M(B_c^+)$ .

<sup>5</sup> 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.

<sup>6</sup> 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.

<sup>7</sup> Might be the  $B_c^*(2S)$ .

## $B_c(2S)^\pm$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1 \quad B_c^+ \pi^+ \pi^-$	seen

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

$\Gamma(B_c^+ \pi^+ \pi^-) / \Gamma_{\text{total}}$	$\Gamma_1 / \Gamma$
<u>VALUE</u>	<u>EVTS</u>
<u>DOCUMENT ID</u>	<u>TECN</u>
<u>COMMENT</u>	
<b>seen</b>	57
<sup>1</sup> AAD	14AQ ATLS
<i>pp</i> at 7, 8 TeV	
• • • We do not use the following data for averages, fits, limits, etc. • • •	
not seen	
<sup>2</sup> AAIJ	18AL LHCB
<i>pp</i> at 8 TeV	

<sup>1</sup> Observed with 5.2 standard deviations significance.

<sup>2</sup> 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.)