

# B<sub>J</sub>(5840)

$$I(J^P) = \frac{1}{2}(??)$$

*I, J, P* need confirmation.

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

## B<sub>J</sub>(5840) MASS

### B<sub>J</sub>(5840)<sup>+</sup> MASS

OUR FIT uses  $m_{B^0}$  and  $m_{B_J(5840)^+} - m_{B^0}$  to determine  $m_{B_J(5840)^+}$ .

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>
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**5851 ± 19 OUR FIT**

### $m_{B_J(5840)^+} - m_{B^0}$

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**571 ± 19 OUR FIT**

<b>571 ± 13 ± 14</b>	7k	<sup>1</sup> AAIJ	15AB LHCB	pp at 7, 8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

595 ± 26 ± 14	7k	<sup>2</sup> AAIJ	15AB LHCB	pp at 7, 8 TeV
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<sup>1</sup> AAIJ 15AB reports  $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 431 \pm 13 \pm 14$  MeV which we adjust by the  $\pi^+$  mass. The masses inside the square brackets were measured for each candidate event. The result assumes  $P = (-1)^J$  and uses two relativistic Breit-Wigner functions in the fit for mass difference.

<sup>2</sup> AAIJ 15AB reports  $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 455 \pm 26 \pm 14$  MeV which we adjust by the  $\pi^+$  mass. The masses inside the square brackets were measured for each candidate event. The result assumes  $P = (-1)^J$  and uses three relativistic Breit-Wigner functions in the fit for mass difference.

### $m_{B_J(5840)^+} - m_{B^{*0}}$

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

565 ± 15 ± 14	7k	<sup>1</sup> AAIJ	15AB LHCB	pp at 7, 8 TeV
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<sup>1</sup> AAIJ 15AB reports  $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 425 \pm 15 \pm 14$  MeV which we adjust by the  $\pi^+$  mass. The masses inside the square brackets were measured for each candidate event. The result assumes  $P = -(-1)^J$ ,  $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$  MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.

### B<sub>J</sub>(5840)<sup>0</sup> MASS

OUR FIT uses  $m_{B^+}$  and  $m_{B_J(5840)^0} - m_{B^+}$  to determine  $m_{B_J(5840)^0}$ .

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>
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**5863 ± 9 OUR FIT**

### $m_{B_J(5840)^0} - m_{B^+}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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#### **584 ± 9 OUR FIT**

<b>584 ± 5 ± 7</b>	12k	<sup>1</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

610 ± 22 ± 7	12k	<sup>2</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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<sup>1</sup> AAIJ 15AB reports  $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 444 \pm 5 \pm 7$  MeV which we adjust by the  $\pi^-$  mass. The masses inside the square brackets were measured for each candidate event. The result assumes  $P = (-1)^J$  and uses two relativistic Breit-Wigner functions in the fit for mass difference.

<sup>2</sup> AAIJ 15AB reports  $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 471 \pm 22 \pm 7$  MeV which we adjust by the  $\pi^-$  mass. The masses inside the square brackets were measured for each candidate event. The result assumes  $P = (-1)^J$  and uses three relativistic Breit-Wigner functions in the fit for mass difference.

### $m_{B_J(5840)^0} - m_{B^{*+}}$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

584 ± 5 ± 7	12k	<sup>1</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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<sup>1</sup> AAIJ 15AB reports  $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 444 \pm 5 \pm 7$  MeV which we adjust by the  $\pi^-$  mass. The masses inside the square brackets were measured for each candidate event. The result assumes  $P = -(-1)^J$ ,  $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$  MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.

## $B_J(5840)$ WIDTH

### $B_J(5840)^+$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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<b>224 ± 24 ± 80</b>	7k	<sup>1</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

215 ± 27 ± 80	7k	<sup>2</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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229 ± 27 ± 80	7k	<sup>3</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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<sup>1</sup> Assuming  $P = (-1)^J$  and using two relativistic Breit-Wigner functions in the fit for mass difference.

<sup>2</sup> Assuming  $P = (-1)^J$  and using three relativistic Breit-Wigner functions in the fit for mass difference.

<sup>3</sup> Assuming  $P = -(-1)^J$  and using three relativistic Breit-Wigner functions in the fit for mass difference.

### $B_J(5840)^0$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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<b>127 ± 17 ± 34</b>	12k	<sup>1</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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• • • We do not use the following data for averages, fits, limits, etc. • • •

107 ± 20 ± 34	12k	<sup>2</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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119 ± 17 ± 34	12k	<sup>3</sup> AAIJ	15AB LHCB	$pp$ at 7, 8 TeV
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- <sup>1</sup> Assuming  $P = (-1)^J$  and using two relativistic Breit-Wigner functions in the fit for mass difference.  
<sup>2</sup> Assuming  $P = (-1)^J$  and using three relativistic Breit-Wigner functions in the fit for mass difference.  
<sup>3</sup> Assuming  $P = -(-1)^J$  and using three relativistic Breit-Wigner functions in the fit for mass difference.

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### $B_J(5840)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $B^* \pi$	seen
$\Gamma_2$ $B \pi$	possibly seen

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### $B_J(5840)$ BRANCHING RATIOS

$\Gamma(B^* \pi)/\Gamma_{\text{total}}$						$\Gamma_1/\Gamma$
VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
<b>seen</b>	7k	AAIJ	15AB LHCB	$\pm$	$pp$ at 7, 8 TeV	
<b>seen</b>	12k	AAIJ	15AB LHCB	0	$pp$ at 7, 8 TeV	

$\Gamma(B \pi)/\Gamma_{\text{total}}$						$\Gamma_2/\Gamma$
VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
<b>possibly seen</b>	7k	<sup>1</sup> AAIJ	15AB LHCB	$\pm$	$pp$ at 7, 8 TeV	
<b>possibly seen</b>		<sup>1</sup> AAIJ	15AB LHCB	0	$pp$ at 7, 8 TeV	

<sup>1</sup> A  $B \pi$  decay is forbidden from a  $P = -(-1)^J$  parent, whereas  $B^* \pi$  is allowed.

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### $B_J(5840)$ REFERENCES

AAIJ      15AB JHEP 1504 024      R. Aaij *et al.*      (LHCb Collab.)

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