

$B_J(5840)$

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

I, J, P need confirmation.

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

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

VALUE (MeV)	DOCUMENT ID
5851 ± 19 OUR FIT	

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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
571 ± 19 OUR FIT				

 $571 \pm 13 \pm 14$ 7k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV

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

595 ± 26 ± 14 7k ² AAIJ 15AB LHCB pp at 7, 8 TeV¹ AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 431 \pm 13 \pm 14$ MeV which we adjust bythe π^+ 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.² AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 455 \pm 26 \pm 14$ MeV which we adjust bythe π^+ 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. **$m_{B_J(5840)^+} - m_{B^{*0}}$**

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

565 ± 15 ± 14 7k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV¹ 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 π^+ 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. **$B_J(5840)^0$ MASS**OUR FIT uses m_{B^+} and $m_{B_J(5840)^0} - m_{B^+}$ to determine $m_{B_J(5840)^0}$.

VALUE (MeV)	DOCUMENT ID
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 **$584 \pm 5 \pm 7$** 12k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV

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

610 ± 22 ± 7 12k ² AAIJ 15AB LHCB pp at 7, 8 TeV

¹ AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 444 \pm 5 \pm 7$ MeV which we adjust by

the π^- 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.

² AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 471 \pm 22 \pm 7$ MeV which we adjust by

the π^- 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 ¹ AAIJ 15AB LHCB pp at 7, 8 TeV

¹ 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 π^- 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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224 ± 24 ± 80 7k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV

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

215 ± 27 ± 80 7k ² AAIJ 15AB LHCB pp at 7, 8 TeV

229 ± 27 ± 80 7k ³ AAIJ 15AB LHCB pp at 7, 8 TeV

¹ Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.

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

³ 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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127 ± 17 ± 34 12k ¹ AAIJ 15AB LHCB pp at 7, 8 TeV

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

107 ± 20 ± 34 12k ² AAIJ 15AB LHCB pp at 7, 8 TeV

119 ± 17 ± 34 12k ³ AAIJ 15AB LHCB pp at 7, 8 TeV

¹ Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.

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

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

$B_J(5840)$ DECAY MODES

Mode		Fraction (Γ_i/Γ)
Γ_1	$B^* \pi$	seen
Γ_2	$B \pi$	possibly seen

$B_J(5840)$ BRANCHING RATIOS

$\Gamma(B^* \pi)/\Gamma_{\text{total}}$						Γ_1/Γ
VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
seen	7k	AAIJ	15AB LHCB	$\pm$	pp at 7, 8 TeV	
seen	12k	AAIJ	15AB LHCB	0	pp at 7, 8 TeV	
$\Gamma(B \pi)/\Gamma_{\text{total}}$						Γ_2/Γ
VALUE	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
possibly seen	7k	¹ AAIJ	15AB LHCB	$\pm$	pp at 7, 8 TeV	
possibly seen		¹ AAIJ	15AB LHCB	0	pp at 7, 8 TeV	
¹ A $B \pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^* \pi$ is allowed.						

$B_J(5840)$ REFERENCES

AAIJ	15AB JHEP 1504 024	R. Aaij <i>et al.</i>	(LHCb Collab.)
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