$B_J(5970)$

$I(J^P) = \frac{1}{2}(?^?)$
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

$B_J(5970)$ MASS

$B_J(5970)^+$ MASS

OUR FIT uses m_{B^0} and $m_{B_J(5970)^+} - m_{B^0}$ to determine $m_{B_J(5970)^+}$.

VALUE (MeV)	*DOCUMENT ID*
5964±5 OUR FIT	

$m_{B_J(5970)^+} - m_{B^0}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
685 ±5 OUR FIT					
685 ±5 OUR AVERAGE					
685.3±4.1± 2.5	2k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
681 ±5 ±12	1.4k	[2] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
686.8±4.5± 2.5	2k	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 545.8 \pm 4.1 \pm 2.5$ 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] AALTONEN 14I reports $m_{B_J(5970)^+} - m_{B^0} - m_{\pi^+} = 541 \pm 5 \pm 12$ MeV which we adjusted by the π^+ mass.

[3] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 547 \pm 5 \pm 3$ 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.

$m_{B_J(5970)^+} - m_{B^{*0}}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
686.0±4.0±2.5	2k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 547 \pm 4 \pm 3$ 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.

$B_J(5970)^0$ MASS

OUR FIT uses m_{B^+} and $m_{B_J(5970)^0} - m_{B^+}$ to determine $m_{B_J(5970)^0}$.

VALUE (MeV)	*DOCUMENT ID*
5971±5 OUR FIT	

$m_{B_J(5970)^0} - m_{B^+}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
691 ±5 OUR FIT					
691 ±5 OUR AVERAGE					
689.9±2.9± 5.1	10k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
698 ±5 ±12	2.6k	[2] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
714.3±6.4± 5.1	10k	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 550.4 \pm 2.9 \pm 5.1$ 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] AALTONEN 14I reports $m_{B_J(5970)^0} - m_{B^+} - m_{\pi^-} = 558 \pm 5 \pm 12$ MeV which we adjusted by the π^- mass.

[3] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 575 \pm 6 \pm 5$ 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.

$m_{B_J(5970)^0} - m_{B^{*+}}$

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
691.6±3.7±5.1	10k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV

[1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 552 \pm 4 \pm 5$ 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.

$B_J(5970)$ WIDTH

$B_J(5970)^+$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
62±20 OUR AVERAGE					
63±15±17	2k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$60^{+30}_{-20}\pm40$	1.4k	AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
61±14±17	2k	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV
61±15±17	2k	[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.

$B_J(5970)^0$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
81±12 OUR AVERAGE					
82± 8± 9	10k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$70^{+30}_{-20}\pm30$	2.6k	AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
56± 7± 9	10k	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV
82±10± 9	10k	[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.

$B_J(5970)$ DECAY MODES

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

$B_J(5970)$ BRANCHING RATIOS

$\Gamma(B\pi)/\Gamma_{total}$ Γ_1/Γ

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
possibly seen	2k	[1] AAIJ	15AB	LHCB	±	pp at 7, 8 TeV
possibly seen	10k	[1] AAIJ	15AB	LHCB	0	pp at 7, 8 TeV
possibly seen	2.6k	AALTONEN	14I	CDF	0	$p\overline{p}$ at 1.96 TeV
possibly seen	1.4k	AALTONEN	14I	CDF	±	$p\overline{p}$ at 1.96 TeV

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

$\Gamma(B^*\pi)/\Gamma_{total}$ Γ_2/Γ

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
seen	10k	AAIJ	15AB	LHCB	0	pp at 7, 8 TeV
seen	2k	AAIJ	15AB	LHCB	±	pp at 7, 8 TeV
seen	2.6k	AALTONEN	14I	CDF	0	$p\overline{p}$ at 1.96 TeV
seen	1.4k	AALTONEN	14I	CDF	±	$p\overline{p}$ at 1.96 TeV

$B_J(5970)$ REFERENCES

AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)