

X(10650) $^\pm$ $I^G(J^P) = ?^+(1^+)$

OMITTED FROM SUMMARY TABLE

Observed by BONDAR 12 in $\Upsilon(5S)$ decays to $\Upsilon(nS)\pi^+\pi^-$ ($n = 1, 2, 3$) and $h_b(mP)\pi^+\pi^-$ ($m = 1, 2$). $J^P = 1^+$ is favored from angular analyses.

X(10650) $^\pm$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
10652.2\pm1.5	¹ BONDAR	12	BELL $e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
10656.7 \pm 5.0 ^{+1.1} _{-3.1}	² GARMASH	15	BELL $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$
10650.7 \pm 1.5 ^{+0.5} _{-0.2}	² GARMASH	15	BELL $e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$
10651.2 \pm 1.0 ^{+0.4} _{-0.3}	² GARMASH	15	BELL $e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$
10657 \pm 6 \pm 3	³ BONDAR	12	BELL $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$
10651 \pm 2 \pm 3	³ BONDAR	12	BELL $e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$
10652 \pm 1 \pm 2	³ BONDAR	12	BELL $e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$
10654 \pm 3 \pm 1	³ BONDAR	12	BELL $e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$
10651 \pm 2 \pm 3	³ BONDAR	12	BELL $e^+e^- \rightarrow h_b(2P)\pi^+\pi^-$

¹ Average of the BONDAR 12 measurements in separate channels.

² Correlated with the corresponding result from BONDAR 12.

³ Superseded by the average measurement of BONDAR 12.

X(10650) $^\pm$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
11.5\pm 2.2	⁴ BONDAR	12	BELL $e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
12.1 ^{+11.3 + 2.7} _{-4.8 - 0.6}	⁵ GARMASH	15	BELL $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$
14.2 \pm 3.7 ^{+ 0.9} _{- 0.4}	⁵ GARMASH	15	BELL $e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$
9.3 \pm 2.2 ^{+ 0.3} _{- 0.5}	⁵ GARMASH	15	BELL $e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$
16.3 \pm 9.8 ^{+ 6.0} _{- 2.0}	⁶ BONDAR	12	BELL $e^+e^- \rightarrow \Upsilon(1S)\pi^+\pi^-$
13.3 \pm 3.3 ^{+ 4.0} _{- 3.0}	⁶ BONDAR	12	BELL $e^+e^- \rightarrow \Upsilon(2S)\pi^+\pi^-$
8.4 \pm 2.0 \pm 2.0	⁶ BONDAR	12	BELL $e^+e^- \rightarrow \Upsilon(3S)\pi^+\pi^-$
20.9 ^{+ 5.4 + 2.1} _{- 4.7 - 5.7}	⁶ BONDAR	12	BELL $e^+e^- \rightarrow h_b(1P)\pi^+\pi^-$
19 \pm 7 \pm 11 _{- 7}	⁶ BONDAR	12	BELL $e^+e^- \rightarrow h_b(2P)\pi^+\pi^-$

⁴ Average of the BONDAR 12 measurements in separate channels.

⁵ Correlated with the corresponding result from BONDAR 12.

⁶ Superseded by the average measurement of BONDAR 12.

$X(10650)^+$ DECAY MODES $X(10650)^-$ decay modes are charge conjugates of the modes below.

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \gamma(1S)\pi^+$	seen
$\Gamma_2 \gamma(2S)\pi^+$	seen
$\Gamma_3 \gamma(3S)\pi^+$	seen
$\Gamma_4 h_b(1P)\pi^+$	seen
$\Gamma_5 h_b(2P)\pi^+$	seen

 $X(10650)^\pm$ BRANCHING RATIOS **$\Gamma(\gamma(1S)\pi^+)/\Gamma_{\text{total}}$** **VALUE**

seen

seen**DOCUMENT ID**

	TECN	COMMENT
GARMASH	15	$e^+ e^- \rightarrow \gamma(1S)\pi^+\pi^-$
BONDAR	12	$e^+ e^- \rightarrow \gamma(1S)\pi^+\pi^-$

 Γ_1/Γ  **$\Gamma(\gamma(2S)\pi^+)/\Gamma_{\text{total}}$** **VALUE**

seen

seen**DOCUMENT ID**

	TECN	COMMENT
GARMASH	15	$e^+ e^- \rightarrow \gamma(2S)\pi^+\pi^-$
BONDAR	12	$e^+ e^- \rightarrow \gamma(2S)\pi^+\pi^-$

 Γ_2/Γ  **$\Gamma(\gamma(3S)\pi^+)/\Gamma_{\text{total}}$** **VALUE**

seen

seen**DOCUMENT ID**

	TECN	COMMENT
GARMASH	15	$e^+ e^- \rightarrow \gamma(3S)\pi^+\pi^-$
BONDAR	12	$e^+ e^- \rightarrow \gamma(3S)\pi^+\pi^-$

 Γ_3/Γ  **$\Gamma(h_b(1P)\pi^+)/\Gamma_{\text{total}}$** **VALUE****seen****DOCUMENT ID**

	TECN	COMMENT
BONDAR	12	$e^+ e^- \rightarrow h_b(1P)\pi^+\pi^-$

 Γ_4/Γ  **$\Gamma(h_b(2P)\pi^+)/\Gamma_{\text{total}}$** **VALUE****seen****DOCUMENT ID**

	TECN	COMMENT
BONDAR	12	$e^+ e^- \rightarrow h_b(2P)\pi^+\pi^-$

 Γ_5/Γ  **$X(10650)^\pm$ REFERENCES**GARMASH 15 PR D91 072003
BONDAR 12 PRL 108 122001A. Garmash *et al.*
A. Bondar *et al.*(BELLE Collab.)
(BELLE Collab.)