

# $T_{c\bar{c}}(4050)^+$

$I^G(J^{PC}) = 1^-(?^?+)$   
 $I, G, C$  need confirmation.

OMITTED FROM SUMMARY TABLE  
 was  $X(4050)$

Properties incompatible with a  $q\bar{q}$  structure (exotic state). See the review on non- $q\bar{q}$  states.

Observed by MIZUK 08 in the  $\pi^+ \chi_{c1}(1P)$  invariant mass distribution in  $\bar{B}^0 \rightarrow K^- \pi^+ \chi_{c1}(1P)$  decays. Not seen by LEES 12B in this same mode after accounting for  $K\pi$  resonant mass and angular structure.

## $T_{c\bar{c}}(4050)^+$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$4051 \pm 14^{+20}_{-41}$	<sup>1</sup> MIZUK	08 BELL	$\bar{B}^0 \rightarrow K^- \pi^+ \chi_{c1}(1P)$

<sup>1</sup> From a Dalitz plot analysis with two Breit-Wigner amplitudes.

## $T_{c\bar{c}}(4050)^+$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$82^{+21+47}_{-17-22}$	<sup>1</sup> MIZUK	08 BELL	$\bar{B}^0 \rightarrow K^- \pi^+ \chi_{c1}(1P)$

<sup>1</sup> From a Dalitz plot analysis with two Breit-Wigner amplitudes.

## $T_{c\bar{c}}(4050)^+$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1 \quad \pi^+ \chi_{c1}(1P)$	seen
$\Gamma_2 \quad \pi^\pm \psi(3770)$	not seen
$\Gamma_3 \quad \pi^\pm \chi_{c0}(1P)$	not seen
$\Gamma_4 \quad \pi^\pm \chi_{c2}(1P)$	not seen

## $T_{c\bar{c}}(4050)^+$ BRANCHING RATIOS

$\Gamma(\pi^+ \chi_{c1}(1P))/\Gamma_{\text{total}}$	$\Gamma_1/\Gamma$			
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>seen</b>		<sup>1</sup> MIZUK	08 BELL	$\bar{B}^0 \rightarrow K^- \pi^+ \chi_{c1}(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	16	<sup>2</sup> ABLIKIM	21W BES3	$e^+ e^- \rightarrow \chi_{cJ} \pi^+ \pi^+$
not seen		<sup>3</sup> LEES	12B BABR	$B \rightarrow K \pi \chi_{c1}(1P)$

<sup>1</sup> With a product branching fraction measurement of  $B(\bar{B}^0 \rightarrow K^- T_{c\bar{c}}(4050)^+) \times B(T_{c\bar{c}}(4050)^+ \rightarrow \pi^+ \chi_{c1}(1P)) = (3.0^{+1.5+3.7}_{-0.8-1.6}) \times 10^{-5}$ .

<sup>2</sup> ABLIKIM 21W measurement is limited by statistics.

<sup>3</sup> With a product branching fraction limit of  $B(\bar{B}^0 \rightarrow T_{c\bar{c}}(4050)^+ K^-) \times B(T_{c\bar{c}}(4050)^+ \rightarrow \chi_{c1} \pi^+) < 1.8 \times 10^{-5}$  at 90% CL.

$\Gamma(\pi^\pm \chi_{c0}(1P))/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>not seen</b>	18	<sup>1</sup> ABLIKIM	21W BES3	$e^+ e^- \rightarrow \chi_{cJ} \pi^+ \pi^+$

<sup>1</sup> ABLIKIM 21W measurement is limited by statistics.

$\Gamma(\pi^\pm \chi_{c2}(1P))/\Gamma_{\text{total}}$   $\Gamma_4/\Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>not seen</b>	14	<sup>1</sup> ABLIKIM	21W BES3	$e^+ e^- \rightarrow \chi_{cJ} \pi^+ \pi^+$

<sup>1</sup> ABLIKIM 21W measurement is limited by statistics.

$\Gamma(\pi^\pm \psi(3770))/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>not seen</b>	<sup>1</sup> ABLIKIM	19AR BES3	$e^+ e^- \rightarrow \pi^+ \pi^- D \bar{D}$

<sup>1</sup> From a measurement of  $\sigma(e^+ e^- \rightarrow \pi^+ \pi^- D \bar{D})$  between  $\sqrt{s} = 4.08$  and 4.6 GeV.

**$T_{c\bar{c}}(4050)^+$  REFERENCES**

ABLIKIM	21W	PR D103 052010	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19AR	PR D100 032005	M. Ablikim <i>et al.</i>	(BESIII Collab.)
LEES	12B	PR D85 052003	J.P. Lees <i>et al.</i>	(BABAR Collab.)
MIZUK	08	PR D78 072004	R. Mizuk <i>et al.</i>	(BELLE Collab.)