

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

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

NODE=M191

NODE=M191

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

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

¹ From a Dalitz plot analysis with two Breit-Wigner amplitudes.

NODE=M191M

NODE=M191M

NODE=M191M;LINKAGE=MI

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

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

¹ From a Dalitz plot analysis with two Breit-Wigner amplitudes.

NODE=M191W

NODE=M191W

NODE=M191W;LINKAGE=MI

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

Mode	Fraction (Γ_i/Γ)
Γ_1 $\pi^+\chi_{c1}(1P)$	seen
Γ_2 $\pi^\pm\psi(3770)$	not seen
Γ_3 $\pi^\pm\chi_{c0}(1P)$	not seen
Γ_4 $\pi^\pm\chi_{c2}(1P)$	not seen

NODE=M191215;NODE=M191

DESIG=1

DESIG=2

DESIG=3

DESIG=4

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

$\Gamma(\pi^+\chi_{c1}(1P))/\Gamma_{\text{total}}$	Γ_1/Γ
VALUE EVTS DOCUMENT ID TECN COMMENT	
seen ¹ 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	² ABLIKIM	21W	BES3	$e^+e^- \rightarrow \chi_{cJ}\pi^+\pi^+$
not seen		³ LEES	12B	BABR	$B \rightarrow K\pi\chi_{c1}(1P)$

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

² ABLIKIM 21W measurement is limited by statistics.

³ 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.

NODE=M191225

NODE=M191R01
NODE=M191R01

NODE=M191R01;LINKAGE=MI

NODE=M191R01;LINKAGE=A
NODE=M191R01;LINKAGE=LE

$\Gamma(\pi^\pm\chi_{c0}(1P))/\Gamma_{\text{total}}$	Γ_3/Γ
VALUE EVTS DOCUMENT ID TECN COMMENT	
not seen 18 ¹ ABLIKIM 21W BES3 $e^+e^- \rightarrow \chi_{cJ}\pi^+\pi^+$	

¹ ABLIKIM 21W measurement is limited by statistics.

NODE=M191R02
NODE=M191R02

NODE=M191R02;LINKAGE=A

$\Gamma(\pi^\pm\chi_{c2}(1P))/\Gamma_{\text{total}}$	Γ_4/Γ
VALUE EVTS DOCUMENT ID TECN COMMENT	
not seen 14 ¹ ABLIKIM 21W BES3 $e^+e^- \rightarrow \chi_{cJ}\pi^+\pi^+$	

¹ ABLIKIM 21W measurement is limited by statistics.

NODE=M191R03
NODE=M191R03

NODE=M191R03;LINKAGE=A

$\Gamma(\pi^\pm\psi(3770))/\Gamma_{\text{total}}$				Γ_2/Γ
VALUE	DOCUMENT ID	TECN	COMMENT	
not seen	¹ ABLIKIM	19AR BES3	$e^+e^- \rightarrow \pi^+\pi^-D\bar{D}$	
¹ From a measurement of $\sigma(e^+e^- \rightarrow \pi^+\pi^-D\bar{D})$ between $\sqrt{s} = 4.08$ and 4.6 GeV.				

NODE=M191R00
NODE=M191R00

NODE=M191R00;LINKAGE=A

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

NODE=M191

REFID=61221
REFID=59910
REFID=54042
REFID=52535