

Reference = ABLIKIM 15AC; PR D92 092006
Verifier code = BES3

PLEASE READ NOW



Normally we send all verifications for one experiment to one person, usually the spokesperson or data-analysis coordinator, who then distributes them to the appropriate people. Please tell us if we should send the verifications for your experiment to someone else.

Xiao-Rui Lyu

EMAIL: xiaorui@ucas.ac.cn

July 21, 2016

Dear Colleague,

- (1) Please check the results of your experiment carefully. They are marked.
- (2) Please reply within one week.
- (3) Please reply even if everything is correct.
- (4) IMPORTANT!! Please tell WHICH papers you are verifying. We have lots of requests out.
- (5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
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RU-630090 Novosibirsk
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$c\bar{c}$ MESONS

$X(3900)$

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

Charged $X(3900)$ seen as a peak in the invariant mass distribution of the $J/\psi\pi^\pm$ system by BES III (ABLIKIM 13T) in $e^+e^- \rightarrow \pi^+\pi^- J/\psi$ at c.m. energy of 4.26 GeV and by radiative return from e^+e^- collisions at $\sqrt{s}$ from 9.46 to 10.86 GeV at Belle (LIU 13B). Angular analysis of ABLIKIM 14A and ABLIKIM 15AC favor the $J^P = 1^+$ assignment. Neutral $X(3900)$ seen in the $J/\psi\pi^0$ invariant mass distribution in $e^+e^- \rightarrow \pi^0\pi^0 J/\psi$ at c.m. energies of 4.23, 4.26, and 4.36 GeV by BES III (ABLIKIM 15U) and at 4.17 GeV by XIAO 13A. Peaks in $(D\bar{D}^*)^{0,\pm}$ reported by BES III (ABLIKIM 14A, ABLIKIM 15AB) are assumed to be related.

NODE=MXXX025

NODE=M210

NODE=M210

$X(3900)$ MASS

NODE=M210M

NODE=M210M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
3886.6 ± 2.4 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
3885.7 ^{+4.3} _{-5.7} ± 8.4		¹ ABLIKIM	15AB BES3	0	$e^+e^- \rightarrow \pi^0(D\bar{D}^*)^0$
YOUR DATA 3881.7 ± 1.6 ± 1.6	1248	¹ ABLIKIM	15AC BES3	±	$e^+e^- \rightarrow \pi^\pm(D\bar{D}^*)^\mp$
3894.8 ± 2.3 ± 3.2	356	¹ ABLIKIM	15U BES3	0	$e^+e^- \rightarrow \pi^0\pi^0 J/\psi$
3883.9 ± 1.5 ± 4.2	1212	¹ ABLIKIM	14A BES3	±	$e^+e^- \rightarrow \pi^\pm(D\bar{D}^*)^\mp$
3899.0 ± 3.6 ± 4.9	307	¹ ABLIKIM	13T BES3	±	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$
3894.5 ± 6.6 ± 4.5	159	¹ LIU	13B BELL	±	$e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
3886 ± 4 ± 2	81	^{1,2} XIAO	13A	±	4.17 $e^+e^- \rightarrow \pi^+\pi^- J/\psi$
3904 ± 9 ± 5	25	^{1,2} XIAO	13A	0	4.17 $e^+e^- \rightarrow \pi^0\pi^0 J/\psi$

¹ Neglecting interference between the $X(3900)$ and non-resonant continuum.

² For $M^2(\pi^+\pi^-) < 0.65 \text{ GeV}^2$. Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

OCCUR=2

NODE=M210M;LINKAGE=A

NODE=M210M;LINKAGE=B

$X(3900)$ WIDTH

NODE=M210W

NODE=M210W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
28.1 ± 2.6 OUR AVERAGE					
35 ⁺¹¹ ₋₁₂ ± 15		¹ ABLIKIM	15AB BES3	0	$e^+e^- \rightarrow \pi^0(D\bar{D}^*)^0$
YOUR DATA 26.6 ± 2.0 ± 2.1	1248	¹ ABLIKIM	15AC BES3	±	$e^+e^- \rightarrow \pi^\pm(D\bar{D}^*)^\mp$
29.6 ± 8.2 ± 8.2	356	¹ ABLIKIM	15U BES3	0	$e^+e^- \rightarrow \pi^0\pi^0 J/\psi$
24.8 ± 3.3 ± 11.0	1212	¹ ABLIKIM	14A BES3	±	$e^+e^- \rightarrow \pi^\pm(D\bar{D}^*)^\mp$
46 ± 10 ± 20	307	¹ ABLIKIM	13T BES3	±	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$
63 ± 24 ± 26	159	¹ LIU	13B BELL	±	$e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
37 ± 4 ± 8	81	^{1,2} XIAO	13A	±	4.17 $e^+e^- \rightarrow \pi^+\pi^- J/\psi$

¹ Neglecting interference between the $X(3900)$ and non-resonant continuum.

² For $M^2(\pi^+\pi^-) < 0.65 \text{ GeV}^2$. Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

NODE=M210W;LINKAGE=A

NODE=M210W;LINKAGE=B

$X(3900)$ BRANCHING RATIOS

NODE=M210225

$\Gamma(D^0 D^{*-} + \text{c.c.})/\Gamma_{\text{total}}$					Γ_4/Γ
VALUE	DOCUMENT ID	TECN	CHG	COMMENT	
YOUR DATA seen	ABLIKIM	15AC BES3	±	$e^+e^- \rightarrow \pi^+ D^0 D^{*-} + \text{c.c.}$	
seen	ABLIKIM	14A BES3	±	$e^+e^- \rightarrow \pi^+ D^0 D^{*-} + \text{c.c.}$	

NODE=M210R09

NODE=M210R09

$\Gamma(D^- D^{*0} + \text{c.c.})/\Gamma_{\text{total}}$					Γ_5/Γ
VALUE	DOCUMENT ID	TECN	CHG	COMMENT	
YOUR DATA seen	ABLIKIM	15AC BES3	±	$e^+e^- \rightarrow \pi^+ D^- D^{*0} + \text{c.c.}$	
seen	ABLIKIM	14A BES3	±	$e^+e^- \rightarrow \pi^+ D^- D^{*0} + \text{c.c.}$	

NODE=M210R10

NODE=M210R10

X(3900) REFERENCES

YOUR PAPER	ABLIKIM	15AB	PRL 115 222002	M. Ablikim <i>et al.</i>	(BES III Collab.)
	ABLIKIM	15AC	PR D92 092006	M. Ablikim <i>et al.</i>	(BES III Collab.) JP
	ABLIKIM	15U	PRL 115 112003	M. Ablikim <i>et al.</i>	(BES III Collab.)
	ABLIKIM	14A	PRL 112 022001	M. Ablikim <i>et al.</i>	(BES III Collab.) JP
	ABLIKIM	13T	PRL 110 252001	M. Ablikim <i>et al.</i>	(BES III Collab.)
	LIU	13B	PRL 110 252002	Z.Q. Liu <i>et al.</i>	(BELLE Collab.)
	XIAO	13A	PL B727 366	T. Xiao <i>et al.</i>	(NWES)

NODE=M210
REFID=56954
REFID=56967
REFID=56786
REFID=55648
REFID=55409
REFID=55410
REFID=55593
NODE=M213

X(4020)

$I(J^P) = 1(?^?)$

Charged X(4020) seen by ABLIKIM 13X from $e^+e^- \rightarrow \pi^+\pi^-h_c(1P)$ at c.m. energy from 3.90 to 4.42 GeV as a peak in the invariant mass distribution of the $\pi^\pm h_c(1P)$ system, and by ABLIKIM 14B from $e^+e^- \rightarrow (D^*\bar{D}^*)^\pm \pi^\mp$ events in $(D^*\bar{D}^*)^\pm$ mass. A neutral X(4020) seen by ABLIKIM 14P at three c.m. energies in the same range in $e^+e^- \rightarrow \pi^0\pi^0h_c(1P)$ as a peak in the larger of the two masses recoiling against a π^0 . ABLIKIM 15AA observes a 5.9σ signal in $(D^*\bar{D}^*)^0$ in $e^+e^- \rightarrow (D^*\bar{D}^*)^0\pi^0$ events using collisions at two c.m. energies. Production rates and mass values support grouping neutral and charged X(4020) together as manifestations of a single $I = 1$ particle.

NODE=M213

X(4020) BRANCHING RATIOS

$\Gamma(D\bar{D}^* + \text{c.c.})/\Gamma_{\text{total}}$				Γ_3/Γ	
VALUE	DOCUMENT ID	TECN	CHG	COMMENT	
YOUR DATA not seen	ABLIKIM	15AC	BES3	$\pm$	$e^+e^- \rightarrow \pi^\pm(D\bar{D}^*)^\mp$

NODE=M213225
NODE=M213R03
NODE=M213R03

X(4020) REFERENCES

YOUR PAPER	ABLIKIM	15AA	PRL 115 182002	M. Ablikim <i>et al.</i>	(BES III Collab.)
	ABLIKIM	15AC	PR D92 092006	M. Ablikim <i>et al.</i>	(BES III Collab.)
	ABLIKIM	14B	PRL 112 132001	M. Ablikim <i>et al.</i>	(BES III Collab.)
	ABLIKIM	14P	PRL 113 212002	M. Ablikim <i>et al.</i>	(BES III Collab.)
	ABLIKIM	13X	PRL 111 242001	M. Ablikim <i>et al.</i>	(BES III Collab.)

NODE=M213
REFID=56951
REFID=56967
REFID=55654
REFID=56118
REFID=55635