

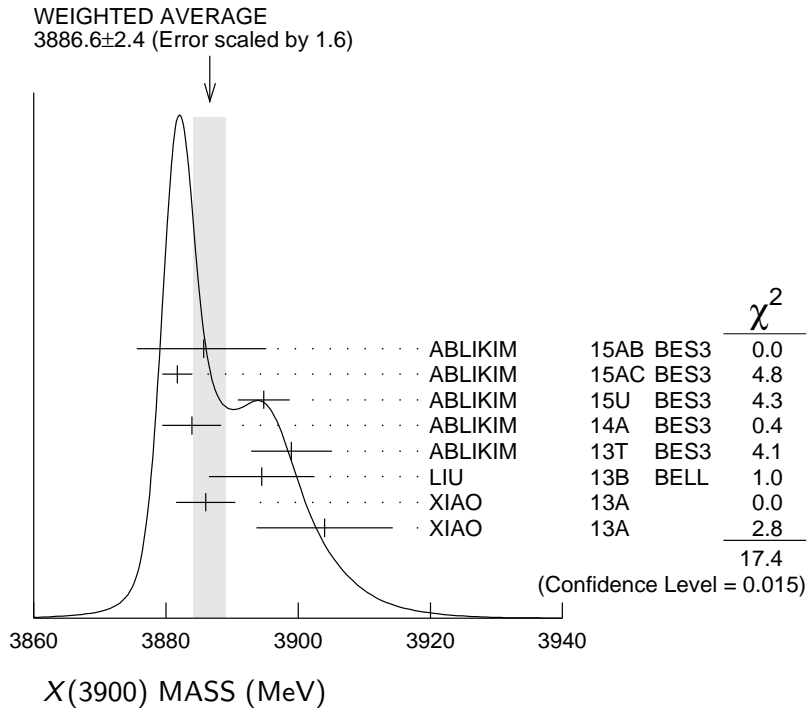
X(3900)

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

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 $e^+e^- \rightarrow \pi^0\pi^0J/\psi$ 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.

X(3900) MASS

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	$e^+e^- \rightarrow \pi^0(D\bar{D}^*)^0$
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	$e^+e^- \rightarrow \pi^0\pi^0J/\psi$
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 $e^+e^- \rightarrow \pi^0\pi^0J/\psi$



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.

X(3900) WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
28.1 ± 2.6 OUR AVERAGE					
35 ⁺¹¹ / ₋₁₂ ± 15		¹ ABLIKIM	15AB BES3	0	$e^+e^- \rightarrow \pi^0(D\bar{D}^*)^0$
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.

X(3900) DECAY MODES

Mode	Fraction (Γ_j/Γ)
Γ_1 $J/\psi\pi$	seen
Γ_2 $h_c\pi^\pm$	not seen
Γ_3 $\eta_c\pi^+\pi^-$	not seen
Γ_4 $(D\bar{D}^*)^\pm$	seen
Γ_5 $D^0D^{*-} + \text{c.c.}$	seen
Γ_6 $D^-D^{*0} + \text{c.c.}$	seen
Γ_7 $\omega\pi^\pm$	not seen
Γ_8 $J/\psi\eta$	not seen
Γ_9 $D^+D^{*-} + \text{c.c.}$	seen
Γ_{10} $D^0\bar{D}^{*0} + \text{c.c.}$	seen

X(3900) BRANCHING RATIOS

$\Gamma(J/\psi\pi)/\Gamma_{\text{total}}$					Γ_1/Γ	
VALUE	CL%	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
seen		356	ABLIKIM	15U BES3	0	$e^+e^- \rightarrow \pi^0\pi^0 J/\psi$
seen		307	ABLIKIM	13T BES3	±	$e^+e^- \rightarrow \pi^+\pi^- J/\psi$
seen		25	¹ XIAO	13A	0	$4.17 e^+e^- \rightarrow \pi^0\pi^0 J/\psi$

• • • We do not use the following data for averages, fits, limits, etc. • • •

not seen 90 ² ADOLPH 15D COMP ± $\gamma N \rightarrow J/\psi\pi^\pm N$

¹ Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration.

² ADOLPH 15D measure $B(X(3900)^\pm \rightarrow J/\psi\pi^\pm) \sigma(\gamma N \rightarrow X(3900)^\pm N)/\sigma(\gamma N \rightarrow J/\psi N) < 3.7 \times 10^{-3}$ at 90% CL.

$\Gamma(h_c \pi^\pm)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
not seen	ABLIKIM	13X	BES3	\pm $e^+ e^- \rightarrow h_c \pi^+ \pi^-$

$\Gamma(\eta_c \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
not seen	¹ VINOKUROVA 15	BELL	0	$B^+ \rightarrow K^+ \eta_c \pi^+ \pi^-$

¹ VINOKUROVA 15 reports $B(B^+ \rightarrow K^+ X(3900)^0) \times B(X \rightarrow \eta_c \pi^+ \pi^-) < 4.7 \times 10^{-5}$ at 90% CL.

$\Gamma((D\bar{D}^*)^\pm)/\Gamma(J/\psi\pi)$ Γ_4/Γ_1

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
6.2 ± 1.1 ± 2.7	¹ ABLIKIM	14A	BES3	\pm $e^+ e^- \rightarrow \pi^\pm (D\bar{D}^*)^\mp$

¹ Assuming the same origin of the $(D\bar{D}^*)^\pm$ and $\pi^\pm J/\psi$ decay modes.

$\Gamma(D^0 D^{*-} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	ABLIKIM	15AC	BES3	\pm $e^+ e^- \rightarrow \pi^+ D^0 D^{*-} + \text{c.c.}$
seen	ABLIKIM	14A	BES3	\pm $e^+ e^- \rightarrow \pi^+ D^0 D^{*-} + \text{c.c.}$

$\Gamma(D^- D^{*0} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	ABLIKIM	15AC	BES3	\pm $e^+ e^- \rightarrow \pi^+ D^- D^{*0} + \text{c.c.}$
seen	ABLIKIM	14A	BES3	\pm $e^+ e^- \rightarrow \pi^+ D^- D^{*0} + \text{c.c.}$

$\Gamma(\omega \pi^\pm)/\Gamma_{\text{total}}$ Γ_7/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
not seen	ABLIKIM	15R	BES3	\pm $e^+ e^- \rightarrow \omega \pi^+ \pi^-$

$\Gamma(J/\psi\eta)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
not seen	ABLIKIM	15Q	BES3	0 4.0–4.6 $e^+ e^- \rightarrow J/\psi \eta \pi^0$

$\Gamma(J/\psi\eta)/\Gamma(J/\psi\pi)$ Γ_8/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
<0.15	90	ABLIKIM	15Q	BES3	0 4.226 $e^+ e^- \rightarrow J/\psi \eta \pi^0$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.65	90	ABLIKIM	15Q	BES3	0 4.257 $e^+ e^- \rightarrow J/\psi \eta \pi^0$
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$\Gamma(D^+ D^{*-} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_9/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	ABLIKIM	15AB	BES3	0 $e^+ e^- \rightarrow \pi^0 (D\bar{D}^*)^0$

$\Gamma(D^0 \bar{D}^{*0} + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
seen	ABLIKIM	15AB	BES3	0 $e^+ e^- \rightarrow \pi^0 (D\bar{D}^*)^0$

$\Gamma(D^+ D^{*-} + c.c.) / \Gamma(D^0 \bar{D}^{*0} + c.c.)$					Γ_9 / Γ_{10}
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
0.96 ± 0.18 ± 0.12	ABLIKIM	15AB BES3	0	$e^+ e^- \rightarrow \pi^0 (D \bar{D}^*)^0$	

X(3900) REFERENCES

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	15Q	PR D92 012008	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	15R	PR D92 032009	M. Ablikim <i>et al.</i>	(BES III Collab.)
ABLIKIM	15U	PRL 115 112003	M. Ablikim <i>et al.</i>	(BES III Collab.)
ADOLPH	15D	PL B742 330	C. Adolph <i>et al.</i>	(COMPASS Collab.)
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova <i>et al.</i>	(BELLE 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.)
ABLIKIM	13X	PRL 111 242001	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)