$X(3915)$

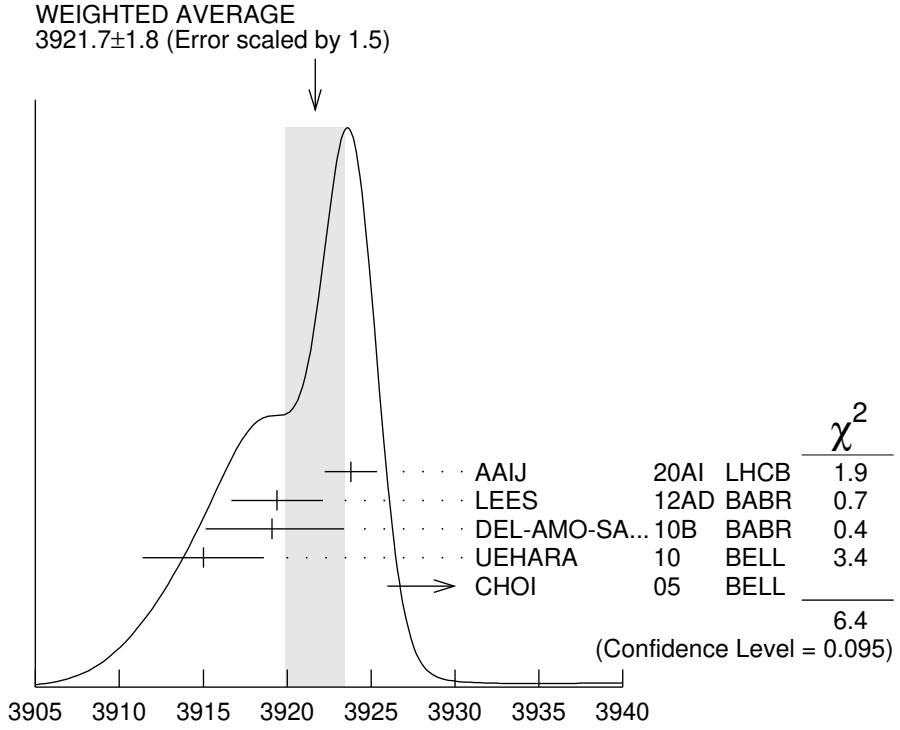
$I^G(J^{PC}) = 0^+(0 \text{ or } 2^{++})$

was $\chi_{c0}(3915)$

The experimental analysis prefers $J^{PC} = 0^{++}$. However, a re-analysis presented in ZHOU 15C shows that if helicity-2 dominance assumption is abandoned and a sizable helicity-0 component is allowed, a $J^{PC} = 2^{++}$ assignment is possible.

$X(3915)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3921.7± 1.8 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
3923.8± 1.5± 0.4	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$
3919.4± 2.2± 1.6	59 ± 10	LEES	12AD	BABR	$e^+e^- \to e^+e^- \omega J/\psi$
$3919.1^{+\ 3.8}_{-\ 3.4}$ ± 2.0		DEL-AMO-SA..	10B	BABR	$B \to \omega J/\psi K$
3915 ± 3 ± 2	49 ± 15	UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^- \omega J/\psi$
3943 ±11 ±13	58 ± 11	[2] CHOI	05	BELL	$B \to \omega J/\psi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3926.4± 2.2± 1.2		[3] ABLIKIM	19V	BES	$e^+e^- \to \gamma\omega J/\psi$
$3914.6^{+\ 3.8}_{-\ 3.4}$ ± 2.0		[2] AUBERT	08W	BABR	Superseded by DEL-AMO-SANCHEZ 10B



[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape.

[2] $\omega J/\psi$ threshold enhancement fitted as an S-wave Breit-Wigner resonance.
[3] Could also be $X(3940)$. Significance 3.1σ. Fit with additional resonance at 3963.7 ± 5.7 MeV, significance 3.4σ.

$X(3915)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
18.8± 3.5 OUR AVERAGE					
$17.4 \pm 5.1 \pm 0.8$	1.2k	[1] AAIJ	20AI	LHCB	$B^+ \to D^+ D^- K^+$
$13 \pm 6 \pm 3$	59	LEES	12AD	BABR	$e^+e^- \to e^+e^- \omega J/\psi$
$31 \ ^{+10}_{-8} \pm 5$		DEL-AMO-SA..	10B	BABR	$B \to \omega J/\psi K$
$17 \pm 10 \pm 3$	49	UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^- \omega J/\psi$
$87 \pm 22 \pm 26$	58	[2] CHOI	05	BELL	$B \to \omega J/\psi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.8 \pm 7.5 \pm 2.6$		[3] ABLIKIM	19V	BES	$e^+e^- \to \gamma\omega J/\psi$
$34 \ ^{+12}_{-8} \pm 5$		[2] AUBERT	08W	BABR	Superseded by DEL-AMO-SANCHEZ 10B

[1] Obtained from the full amplitude analysis. Parameterized with the relativistic Breit-Wigner line shape.
[2] $\omega J/\psi$ threshold enhancement fitted as an S-wave Breit-Wigner resonance.
[3] Could also be $X(3940)$. Significance 3.1σ. Fit with additional resonance at 3963.7 ± 5.7 MeV, significance 3.4σ.

$X(3915)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\omega J/\psi$	seen
Γ_2	$\overline{D}^{*0} D^0$	
Γ_3	$\pi^+\pi^-\eta_c(1S)$	not seen
Γ_4	$\eta_c\eta$	not seen
Γ_5	$\eta_c\pi^0$	not seen
Γ_6	$K\overline{K}$	not seen
Γ_7	$\gamma\gamma$	seen
Γ_8	$\pi^0\chi_{c1}$	

$X(3915)$ Γ(i)Γ(γγ)/Γ(total)

$\Gamma(\omega J/\psi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ $\quad \Gamma_1\Gamma_7/\Gamma$

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
54± 9 OUR AVERAGE					
$52 \pm 10 \pm 3$	59 ± 10	[1] LEES	12AD	BABR	$e^+e^- \to e^+e^- \omega J/\psi$
$61 \pm 17 \pm 8$	49 ± 15	[1] UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^- \omega J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$18 \pm 5 \pm 2$	49 ± 15	[2] UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^- \omega J/\psi$

[1] For $J^P = 0^+$.
[2] For $J^P = 2^+$, helicity-2.

$\Gamma(\pi^+\pi^-\eta_c(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_3\Gamma_7/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<16	90	LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_6\Gamma_7/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.96	90	UEHARA	13	BELL	$\gamma\gamma \to K^0_S K^0_S$

$X(3915)$ BRANCHING RATIOS

$\Gamma(\omega J/\psi)/\Gamma_{total}$ Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	[1] DEL-AMO-SA..10B		BABR	$B \to \omega J/\psi K$
seen	[2] CHOI	05	BELL	$B \to \omega J/\psi K$

[1] DEL-AMO-SANCHEZ 10B reports $B(B^\pm \to X(3915)K^\pm) \times B(X(3915) \to J/\psi\omega) = (3.0^{+0.7}_{-0.6}{}^{+0.5}_{-0.3}) \times 10^{-5}$ and $B(B^0 \to X(3915)K^0) \times B(X(3915) \to J/\psi\omega) = (2.1 \pm 0.9 \pm 0.3) \times 10^{-5}$.

[2] CHOI 05 reports $B(B \to X(3915)K) \times B(X(3915) \to J/\psi\omega) = (7.1 \pm 1.3 \pm 3.1) \times 10^{-5}$.

$\Gamma(\omega J/\psi)/\Gamma(\overline{D}^{*0}D^0)$ Γ_1/Γ_2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
>0.71	90	[1] AUSHEV	10	BELL	$B \to \overline{D}^{*0}D^0K$

[1] By combining the upper limit $B(B \to X(3915)K) \times B(X(3915) \to D^{*0}\overline{D}^0) < 0.67 \times 10^{-4}$ from AUSHEV 10 with the average of CHOI 05 and AUBERT 08W measurements $B(B \to X(3915)K) \times B(X(3915) \to \omega J/\psi) = (0.51 \pm 0.11) \times 10^{-4}$.

$\Gamma(\eta_c\eta)/\Gamma_{total}$ Γ_4/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
not seen	90	[1] VINOKUROVA 15		BELL	$B^+ \to K^+\eta_c\eta$

[1] VINOKUROVA 15 reports $B(B^+ \to K^+X(3915)^0) \times B(X \to \eta_c\eta) < 4.7 \times 10^{-5}$ at 90% CL.

$\Gamma(\eta_c\pi^0)/\Gamma_{total}$ Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
not seen	90	[1] VINOKUROVA 15		BELL	$B^+ \to K^+\eta_c\pi^0$

[1] VINOKUROVA 15 reports $B(B^+ \to K^+X(3915)^0) \times B(X \to \eta_c\pi^0) < 1.7 \times 10^{-5}$ at 90% CL.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_7/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	59 ± 10	LEES	12AD	BABR	$e^+e^- \to e^+e^-\omega J/\psi$
seen		UEHARA	10	BELL	10.6 $e^+e^- \to e^+e^-\omega J/\psi$

$\Gamma(\pi^0\chi_{c1})/\Gamma_{total}$ Γ_8/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen	42 ± 14	[1] BHARDWAJ	19	BELL	$B^\pm \to \chi_{c1}\pi^0K^\pm$

[1] BHARDWAJ 19 reports $B(B^+ \to K^+ X(3915)) \times B(X(3915) \to \chi_{c1}\pi^0) < 3.8 \times 10^{-5}$ at 90% CL. A signal significance 2.3 standard deviations.

X(3915) REFERENCES

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ABLIKIM	19V	PRL 122 232002	M. Ablikim *et al.*	(BESIII Collab.)
BHARDWAJ	19	PR D99 111101	V. Bhardwaj *et al.*	(BELLE Collab.)
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova *et al.*	(BELLE Collab.)
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ZHOU	15C	PRL 115 022001	Z.-Y. Zhou, Z. Xiao, H.-Q. Zhou	(BEIJT, NANJ)
UEHARA	13	PTEP 2013 123C01	S. Uehara *et al.*	(BELLE Collab.)
LEES	12AD	PR D86 072002	J.P. Lees *et al.*	(BABAR Collab.)
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)
AUSHEV	10	PR D81 031103	T. Aushev *et al.*	(BELLE Collab.)
DEL-AMO-SA...	10B	PR D82 011101	P. del Amo Sanchez *et al.*	(BABAR Collab.)
UEHARA	10	PRL 104 092001	S. Uehara *et al.*	(BELLE Collab.)
AUBERT	08W	PRL 101 082001	B. Aubert *et al.*	(BABAR Collab.)
CHOI	05	PRL 94 182002	S.-K. Choi *et al.*	(BELLE Collab.)