Reference = LEES 14F; PR D89 111103
Verifier code = BABAR

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

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Fabio Anulli

EMAIL: anulli@slac.stanford.edu

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
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

$c\bar{c}$ MESONS

NODE=MXXX025

$X(4360)$

NODE=M181

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

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54$–10.58 GeV by AUBERT 07S, WANG 07D, and LEES 14F. See also the review under the $X(3872)$ particle listings. (See the index for the page number.)

NODE=M181

$X(4360)$ MASS

NODE=M181M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	4346± 6 OUR AVERAGE					
	$4347 \pm 6 \pm 3$	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA	$4340 \pm 16 \pm 9$	37	[2] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	$4355^{+9}_{-10} \pm 9$	74	[3] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	4324 ± 24		[4] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	$4361 \pm 9 \pm 9$	47	[2] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M181M

NODE=M181M;LINKAGE=A

YOUR NOTE [2] From a two-resonance fit. NODE=M181M;LINKAGE=WA

NODE=M181M;LINKAGE=LI

[3] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.

[4] From a single-resonance fit. Systematic errors not estimated. NODE=M181M;LINKAGE=AU

$X(4360)$ WIDTH

NODE=M181W

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	102±10 OUR AVERAGE					
	$103 \pm 9 \pm 5$	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA	$94 \pm 32 \pm 13$	37	[2] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	$103^{+17}_{-15} \pm 11$	74	[3] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	172 ± 33		[4] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	$74 \pm 15 \pm 10$	47	[2] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M181W

NODE=M181W;LINKAGE=A

YOUR NOTE [2] From a two-resonance fit. NODE=M181W;LINKAGE=WA

NODE=M181W;LINKAGE=LI

[3] From a combined fit of AUBERT 07S and WANG 07D data with two resonances.

[4] From a single-resonance fit. Systematic errors not estimated. NODE=M181W;LINKAGE=AU

$X(4360)$ $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M181230

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ **$\Gamma_2\Gamma_1/\Gamma$**

NODE=M181G1

	VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	$9.2 \pm 0.6 \pm 0.6$	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	$10.9 \pm 0.6 \pm 0.7$	279	[2] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA	$6.0 \pm 1.0 \pm 0.5$	37	[3] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA	$7.2 \pm 1.0 \pm 0.6$	37	[4] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	$11.1^{+1.3}_{-1.2}$	74	[5] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	12.3 ± 1.2	74	[6] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	$10.4 \pm 1.7 \pm 1.5$	47	[3] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	$11.8 \pm 1.8 \pm 1.4$	47	[4] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

NODE=M181G1

NODE=M181G1

OCCUR=2

OCCUR=2

OCCUR=2

[1] Solution I of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M181G1;LINKAGE=A

[2] Solution II of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M181G1;LINKAGE=B

YOUR NOTE [3] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WA

YOUR NOTE [4] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WN

[5] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181G1;LINKAGE=LI

[6] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181G1;LINKAGE=LU

X(4360) REFERENCES

NODE=M181

	WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)	REFID=56839
YOUR PAPER	LEES	14F	PR D89 111103	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55938
	LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan		REFID=52296
	AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51724
	WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)	REFID=51959

NODE=M189

X(4660)

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

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54$–10.58 GeV by WANG 07D. Also obtained in a combined fit of WANG 07D, AUBERT 07S, and LEES 14F. See also the review under the X(3872) particle listings. (See the index for the page number.)

NODE=M189

X(4660) MASS

NODE=M189M

NODE=M189M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
4643± 9 OUR AVERAGE		Error includes scale factor of 1.2.			
$4652\pm10\pm11$	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA $4669\pm21\pm3$	37	[2] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$4634^{+\ 8}_{-\ 7}{}^{+\ 5}_{-\ 8}$	142	[3] PAKHLOVA	08B	BELL	$e^+e^- \to \Lambda_c^+\Lambda_c^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4661^{+\ 9}_{-\ 8}\pm6$	44	[4] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$4664\pm11\pm5$	44	WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

[1] From a two-resonance fit. Supersedes WANG 07D. — NODE=M189M;LINKAGE=A

YOUR NOTE

[2] From a two-resonance fit. — NODE=M189M;LINKAGE=LE

[3] The $\pi^+\pi^-\psi(2S)$ and $\Lambda_c^+\Lambda_c^-$ states are not necessarily the same. — NODE=M189M;LINKAGE=PA

[4] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. — NODE=M189M;LINKAGE=LI

X(4660) WIDTH

NODE=M189W

NODE=M189W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
72±11 OUR AVERAGE					
$68\pm11\pm5$	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA $104\pm48\pm10$	37	[2] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$92^{+40}_{-24}{}^{+10}_{-21}$	142	[3] PAKHLOVA	08B	BELL	$e^+e^- \to \Lambda_c^+\Lambda_c^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$42^{+17}_{-12}\pm6$	44	[4] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$48\pm15\pm3$	44	WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

[1] From a two-resonance fit. Supersedes WANG 07D. — NODE=M189W;LINKAGE=A

YOUR NOTE

[2] From a two-resonance fit. — NODE=M189W;LINKAGE=LE

[3] The $\pi^+\pi^-\psi(2S)$ and $\Lambda_c^+\Lambda_c^-$ states are not necessarily the same. — NODE=M189W;LINKAGE=B

[4] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. — NODE=M189W;LINKAGE=LI

X(4660) Γ(i) × Γ(e^+e^-)/Γ(total)

NODE=M189230

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_2\Gamma_1/\Gamma$

NODE=M189G1

NODE=M189G1

VALUE (eV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$2.0\pm0.3\pm0.2$	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
$8.1\pm1.1\pm1.0$	279	[2] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
YOUR DATA $2.7\pm1.3\pm0.5$	37	[3] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
YOUR DATA $7.5\pm1.7\pm0.7$	37	[4] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
$2.2^{+0.7}_{-0.6}$	44	[5] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
5.9 ± 1.6	44	[6] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
$3.0\pm0.9\pm0.3$	44	[3] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
$7.6\pm1.8\pm0.8$	44	[4] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2

[1] Solution I of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M189G1;LINKAGE=A

[2] Solution II of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M189G1;LINKAGE=B

YOUR NOTE [3] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M189G1;LINKAGE=WA

YOUR NOTE [4] Solution II of two equivalent solutions in a fit using two interfering resonances. NODE=M189G1;LINKAGE=WN

[5] Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M189G1;LINKAGE=LI

[6] Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M189G1;LINKAGE=LU

X(4660) REFERENCES

NODE=M189

	WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)	REFID=56839
YOUR PAPER	LEES	14F	PR D89 111103	J.P. Lees *et al.*	(BABAR Collab.)	REFID=55938
	LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan		REFID=52296
	PAKHLOVA	08B	PRL 101 172001	C. Pakhlova *et al.*	(BELLE Collab.)	REFID=52596
	AUBERT	07S	PRL 98 212001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51724
	WANG	07D	PRL 99 142002	X.L. Wang *et al.*	(BELLE Collab.)	REFID=51959