Reference = WANG 15A; PR D91 112007
Verifier code = SAKAI

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

Yoshihide Sakai

EMAIL: yoshihide.sakai@kek.jp

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

NODE=M223

$X(4055)^{\pm}$

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

OMITTED FROM SUMMARY TABLE

Needs confirmation. Seen by WANG 15A in the $\psi(2S)\pi^+$ invariant mass distribution in $X(4360) \rightarrow \psi(2S)\pi^+\pi^-$ decay.

NODE=M223

$X(4055)^{\pm}$ MASS

NODE=M223M

	VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**4054±3±1**	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

YOUR NOTE [1] Statistical significance of 3.5 σ.

NODE=M223M

NODE=M223M;LINKAGE=A

$X(4055)^{\pm}$ WIDTH

NODE=M223W

	VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**45±11±6**	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

YOUR NOTE [1] Statistical significance of 3.5 σ.

NODE=M223W

NODE=M223W;LINKAGE=A

$X(4055)^{\pm}$ BRANCHING RATIOS

NODE=M223225

$\Gamma(\pi^+\psi(2S))/\Gamma_{total}$ **Γ_1/Γ**

NODE=M223R01

	VALUE	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**seen**	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

NODE=M223R01

YOUR NOTE [1] Statistical significance of 3.5 σ.

NODE=M223R01;LINKAGE=A

$X(4055)^{\pm}$ REFERENCES

NODE=M223

YOUR PAPER WANG 15A PR D91 112007 X.L. Wang *et al.* (BELLE Collab.)

REFID=56839

NODE=M181

$X(4360)$

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

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					
YOUR DATA	4347± 6±3	279	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
	4340±16±9	37	[2] LEES	14F	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	$4355^{+9}_{-10}\pm9$	74	[3] LIU	08H	RVUE	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
	4324±24		[4] AUBERT	07S	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
	4361± 9±9	47	[2] WANG	07D	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

YOUR NOTE
[1] From a two-resonance fit. Supersedes WANG 07D.
[2] From a two-resonance fit.
[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=A
NODE=M181M;LINKAGE=WA
NODE=M181M;LINKAGE=LI
NODE=M181M;LINKAGE=AU

$X(4360)$ WIDTH

NODE=M181W

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	102±10 OUR AVERAGE					
YOUR DATA	103± 9± 5	279	[1] WANG	15A	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$
	94±32±13	37	[2] LEES	14F	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$

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

$103^{+17}_{-15}\pm11$	74	[3] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
172 ± 33		[4] AUBERT	07S	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$74\pm15\pm10$	47	[2] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

YOUR NOTE
[1] From a two-resonance fit. Supersedes WANG 07D. NODE=M181W;LINKAGE=A
[2] From a two-resonance fit. NODE=M181W;LINKAGE=WA
[3] From a combined fit of AUBERT 07S and WANG 07D data with two resonances. NODE=M181W;LINKAGE=LI
[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
NODE=M181G1

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
YOUR DATA $9.2\pm0.6\pm0.6$	279	[1] WANG	15A BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
YOUR DATA $10.9\pm0.6\pm0.7$	279	[2] WANG	15A BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$ OCCUR=2
$6.0\pm1.0\pm0.5$	37	[3] LEES	14F BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$7.2\pm1.0\pm0.6$	37	[4] LEES	14F BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$ OCCUR=2
$11.1^{+1.3}_{-1.2}$	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 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$ OCCUR=2
$10.4\pm1.7\pm1.5$	47	[3] WANG	07D BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$11.8\pm1.8\pm1.4$	47	[4] WANG	07D BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$ OCCUR=2

YOUR NOTE
[1] Solution I of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M181G1;LINKAGE=A
YOUR NOTE
[2] Solution II of two equivalent solutions from a fit using two interfering resonances. Supersedes WANG 07D. NODE=M181G1;LINKAGE=B
[3] Solution I of two equivalent solutions in a fit using two interfering resonances. NODE=M181G1;LINKAGE=WA
[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

YOUR PAPER

WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.) REFID=56839
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.		
YOUR DATA $4652\pm10\pm11$	279	[1] WANG	15A BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
$4669\pm21\pm3$	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 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

YOUR NOTE
[1] From a two-resonance fit. Supersedes WANG 07D. NODE=M189M;LINKAGE=A
[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					
YOUR DATA	68±11± 5	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	104±48±10	37	[2] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	92^{+40+10}_{-24-21}	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}± 6	44	[4] LIU	08H	RVUE	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$
	48±15± 3	44	WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$

YOUR NOTE

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

[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

$X(4660)$ $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M189230

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

NODE=M189G1

NODE=M189G1

	VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT	
	• • • We do not use the following data for averages, fits, limits, etc. • • •						
YOUR DATA	2.0±0.3±0.2	279	[1] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
YOUR DATA	8.1±1.1±1.0	279	[2] WANG	15A	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2
	2.7±1.3±0.5	37	[3] LEES	14F	BABR	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
	7.5±1.7±0.7	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±0.9±0.3	44	[3] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	
	7.6±1.8±0.8	44	[4] WANG	07D	BELL	10.58 $e^+e^- \to \gamma\pi^+\pi^-\psi(2S)$	OCCUR=2

YOUR NOTE

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

YOUR NOTE

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

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

[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

YOUR PAPER	WANG	15A	PR D91 112007	X.L. Wang *et al.*	(BELLE Collab.)	REFID=56839
	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