

Reference = HAN 15; PR D92 012011
Verifier code = BELLE

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.

Karim Trabelsi

EMAIL: karim.trabelsi@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
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Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

$c\bar{c}$ MESONS

$\psi(4040)$

$$I^G(J^{PC}) = 0^-(1^{--})$$

$\psi(4040) \Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{22}\Gamma_1/\Gamma$

VALUE (eV) CL% DOCUMENT ID TECN COMMENT

YOUR DATA **<2.9** 90 13 HAN 15 BELL 10.58 $e^+e^- \rightarrow \chi_{c1}\gamma$

YOUR NOTE ¹³ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{23}\Gamma_1/\Gamma$

VALUE (eV) CL% DOCUMENT ID TECN COMMENT

YOUR DATA **<4.6** 90 14 HAN 15 BELL 10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

YOUR NOTE ¹⁴ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

$\psi(4040)$ REFERENCES

YOUR PAPER HAN 15 PR D92 012011 Y.L. Han *et al.* (BELLE Collab.)

$\psi(4160)$

$$I^G(J^{PC}) = 0^-(1^{--})$$

$\psi(4160) \Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{25}\Gamma_1/\Gamma$

VALUE (eV) CL% DOCUMENT ID TECN COMMENT

YOUR DATA **<2.2** 90 13 HAN 15 BELL 10.58 $e^+e^- \rightarrow \chi_{c1}\gamma$

YOUR NOTE ¹³ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{26}\Gamma_1/\Gamma$

VALUE (eV) CL% DOCUMENT ID TECN COMMENT

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

YOUR DATA <6.1 90 14 HAN 15 BELL 10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

YOUR NOTE ¹⁴ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

$\psi(4160)$ REFERENCES

YOUR PAPER HAN 15 PR D92 012011 Y.L. Han *et al.* (BELLE Collab.)

$X(4260)$

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

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54\text{--}10.58$ GeV by AUBERT,B 05I, HE 06B, and YUAN 07, and in e^+e^- collisions at $\sqrt{s} \approx 4.26$ GeV by COAN 06. Possibly seen by AUBERT 06 in $B^- \rightarrow K^- \pi^+ \pi^- J/\psi$. See also the mini-review under the $X(3872)$. (See the index for the page number.)

$X(4260) \Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{18}\Gamma_1/\Gamma$

VALUE (eV) CL% DOCUMENT ID TECN COMMENT

YOUR DATA **<1.4** 90 1 HAN 15 BELL 10.58 $e^+e^- \rightarrow \chi_{c1}\gamma$

YOUR NOTE ¹ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.

NODE=MXXX025

NODE=M072

NODE=M072235

NODE=M072G01
NODE=M072G01

NODE=M072G01;LINKAGE=A

NODE=M072G02
NODE=M072G02

NODE=M072G02;LINKAGE=A

NODE=M072

REFID=56816
NODE=M025

NODE=M025235

NODE=M025G01
NODE=M025G01

NODE=M025G01;LINKAGE=A

NODE=M025G02
NODE=M025G02

NODE=M025G02;LINKAGE=A

NODE=M025

REFID=56816
NODE=M074

NODE=M074

NODE=M074230

NODE=M074G03
NODE=M074G03

NODE=M074G03;LINKAGE=A

$$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{19}\Gamma_1/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<4.0	90	¹ HAN	15	BELL 10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

YOUR DATA

YOUR NOTE ¹ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.NODE=M074G04
NODE=M074G04

NODE=M074G04;LINKAGE=A

X(4260) REFERENCES

NODE=M074

YOUR PAPER	HAN	15	PR D92 012011	Y.L. Han <i>et al.</i>	(BELLE Collab.)
	YUAN	07	PRL 99 182004	C.Z. Yuan <i>et al.</i>	(BELLE Collab.)
	AUBERT	06	PR D73 011101	B. Aubert <i>et al.</i>	(BABAR Collab.)
	COAN	06	PRL 96 162003	T.E. Coan <i>et al.</i>	(CLEO Collab.)
	HE	06B	PR D74 091104	Q. He <i>et al.</i>	(CLEO Collab.)
	AUBERT,B	05I	PRL 95 142001	B. Aubert <i>et al.</i>	(BABAR Collab.)

REFID=56816
REFID=51960
REFID=51017
REFID=51075
REFID=51523
REFID=50776
NODE=M181**X(4360)**

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

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54\text{--}10.58$ 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) $\Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M181230

$$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_6\Gamma_1/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<0.57	90	¹ HAN	15	BELL 10.58 $e^+e^- \rightarrow \chi_{c1}\gamma$

YOUR DATA

YOUR NOTE ¹ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.NODE=M181G02
NODE=M181G02

NODE=M181G02;LINKAGE=A

$$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_7\Gamma_1/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.9	90	¹ HAN	15	BELL 10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

YOUR DATA

YOUR NOTE ¹ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.NODE=M181G03
NODE=M181G03

NODE=M181G03;LINKAGE=A

X(4360) REFERENCES

NODE=M181

YOUR PAPER	HAN	15	PR D92 012011	Y.L. Han <i>et al.</i>	(BELLE Collab.)
	LEES	14F	PR D89 111103	J.P. Lees <i>et al.</i>	(BABAR Collab.)
	AUBERT	07S	PRL 98 212001	B. Aubert <i>et al.</i>	(BABAR Collab.)
	WANG	07D	PRL 99 142002	X.L. Wang <i>et al.</i>	(BELLE Collab.)

REFID=56816
REFID=55938
REFID=51724
REFID=51959
NODE=M073 **$\psi(4415)$**

$$J^G(J^{PC}) = 0^-(1^{--})$$

 $\psi(4415) \Gamma(i) \times \Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M073230

$$\Gamma(\chi_{c1}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{19}\Gamma_{21}/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<0.47	90	¹⁵ HAN	15	BELL 10.58 $e^+e^- \rightarrow \chi_{c1}\gamma$

YOUR DATA

YOUR NOTE ¹⁵ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.NODE=M073G02
NODE=M073G02

NODE=M073G02;LINKAGE=A

$$\Gamma(\chi_{c2}\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{20}\Gamma_{21}/\Gamma$$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<2.3	90	¹⁶ HAN	15	BELL 10.58 $e^+e^- \rightarrow \chi_{c2}\gamma$

YOUR DATA

YOUR NOTE ¹⁶ Using $B(\eta \rightarrow \gamma\gamma) = (39.41 \pm 0.21)\%$.NODE=M073G03
NODE=M073G03

NODE=M073G03;LINKAGE=A

 $\psi(4415)$ REFERENCES

NODE=M073

YOUR PAPER	HAN	15	PR D92 012011	Y.L. Han <i>et al.</i>	(BELLE Collab.)
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REFID=56816
NODE=M189**X(4660)**

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

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54\text{--}10.58$ GeV by WANG 07D. Also obtained in a combined fit of WANG 07D,

NODE=M189

AUBERT 07S, and LEES 14F. See also the review under the X(3872) particle listings. (See the index for the page number.)

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

NODE=M189230

$\Gamma(\chi_{c1} \gamma) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$		$\Gamma_5 \Gamma_1 / \Gamma$	
VALUE (eV)	CL%	DOCUMENT ID	TECN COMMENT

NODE=M189G02
NODE=M189G02

YOUR DATA <0.45 90 ¹ HAN 15 BELL 10.58 $e^+ e^- \rightarrow \chi_{c1} \gamma$ |

YOUR NOTE ¹ Using $B(\eta \rightarrow \gamma \gamma) = (39.41 \pm 0.21)\%$. |

NODE=M189G02;LINKAGE=A

$\Gamma(\chi_{c2} \gamma) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$		$\Gamma_6 \Gamma_1 / \Gamma$	
VALUE (eV)	CL%	DOCUMENT ID	TECN COMMENT

NODE=M189G03
NODE=M189G03

YOUR DATA <2.1 90 ¹ HAN 15 BELL 10.58 $e^+ e^- \rightarrow \chi_{c2} \gamma$ |

YOUR NOTE ¹ Using $B(\eta \rightarrow \gamma \gamma) = (39.41 \pm 0.21)\%$. |

NODE=M189G03;LINKAGE=A

X(4660) REFERENCES

NODE=M189

YOUR PAPER	HAN	15	PR D92 012011	Y.L. Han <i>et al.</i>	(BELLE Collab.)
	LEES	14F	PR D89 111103	J.P. Lees <i>et al.</i>	(BABAR Collab.)
	AUBERT	07S	PRL 98 212001	B. Aubert <i>et al.</i>	(BABAR Collab.)
	WANG	07D	PRL 99 142002	X.L. Wang <i>et al.</i>	(BELLE Collab.)

REFID=56816
REFID=55938
REFID=51724
REFID=51959