Reference = SANTEL 16; PR D93 011101
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

$b\bar{b}$ MESONS

NODE=MXXX030

NODE=M092

$\Upsilon(10860)$ $I^G(J^{PC}) = 0^-(1^{--})$

$\Upsilon(10860)$ MASS

NODE=M092M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
10891.1 ± 3.2 $^{+1.2}_{-2.0}$	[1] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$10881.8^{+1.0}_{-1.1} \pm 1.2$	[2,3] SANTEL	16	BELL	$e^+e^- \to$ hadrons	
10879 ± 3	[4,5] CHEN	10	BELL	$e^+e^- \to$ hadrons	
$10888.4^{+2.7}_{-2.6} \pm 1.2$	[6] CHEN	10	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
10876 ± 2	[4] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	
10869 ± 2	[7] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	OCCUR=2
10868 ± 6 ±5	[8] BESSON	85	CLEO	$e^+e^- \to$ hadrons	
10845 ±20	[9] LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons	

YOUR NOTE [1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3 cross sections at 25 energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with fourteen resonance parameters (a mass, width, and three amplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relative phase, and three decoherence coefficients, one for each n). Continuum contributions were measured (and therefore fixed) to be zero. NODE=M092M;LINKAGE=C

YOUR NOTE [2] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M092M;LINKAGE=A

YOUR NOTE [3] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M092M;LINKAGE=B

[4] In a model where a flat non-resonant $b\bar{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated. NODE=M092M;LINKAGE=AU

[5] The parameters of the $\Upsilon(11020)$ are fixed to those in AUBERT 09E. NODE=M092M;LINKAGE=CH

[6] In a model where a flat nonresonant $\Upsilon(1S,2S,3S)\pi^+\pi^-$ continuum interferes with a single Breit-Wigner resonance. NODE=M092M;LINKAGE=CE

[7] In a model where a non-resonant $b\bar{b}$-continuum represented by a threshold function at $\sqrt{s}$=$2m_B$ is incoherently added to a flat component interfering with two Breit-Wigner resonances. Not independent of other AUBERT 09E results. Systematic uncertainties not estimated. NODE=M092M;LINKAGE=UB

[8] Assuming four Gaussians with radiative tails and a single step in R. NODE=M092M;LINKAGE=BE

[9] In a coupled-channel model with three resonances and a smooth step in R. NODE=M092M;LINKAGE=LO

$\Upsilon(10860)$ WIDTH

NODE=M092W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
53.7 $^{+7.1}_{-5.6}$ $^{+1.3}_{-5.4}$	[10] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$48.5^{+1.9}_{-1.8}$ $^{+2.0}_{-2.8}$	[11,12] SANTEL	16	BELL	$e^+e^- \to$ hadrons	
46^{+9}_{-7}	[13,14] CHEN	10	BELL	$e^+e^- \to$ hadrons	
$30.7^{+8.3}_{-7.0} \pm 3.1$	[15] CHEN	10	BELL	$e^+e^- \to \Upsilon(1S,2S,3S)\pi^+\pi^-$	OCCUR=2
43 ± 4	[13] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	
74 ± 4	[16] AUBERT	09E	BABR	$e^+e^- \to$ hadrons	OCCUR=2
112 ±17 ±23	[17] BESSON	85	CLEO	$e^+e^- \to$ hadrons	
110 ±15	[18] LOVELOCK	85	CUSB	$e^+e^- \to$ hadrons	

YOUR NOTE [10] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3 cross sections at 25 energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with fourteen resonance parameters (a mass, width, and three amplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relative phase, and three decoherence coefficients, one for each n). Continuum contributions were measured (and therefore fixed) to be zero. NODE=M092W;LINKAGE=C

YOUR NOTE [11] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M092W;LINKAGE=A

YOUR NOTE [12] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M092W;LINKAGE=B

[13] In a model where a flat non-resonant $b\bar{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated. NODE=M092W;LINKAGE=AU

[14] The parameters of the $\Upsilon(11020)$ are fixed to those in AUBERT 09E. NODE=M092W;LINKAGE=CH

[15] In a model where a flat nonresonant $\Upsilon(1S, 2S, 3S)\pi^+\pi^-$ continuum interferes with a single Breit-Wigner resonance. NODE=M092W;LINKAGE=CE

[16] In a model where a non-resonant $b\bar{b}$-continuum represented by a threshold function at $\sqrt{s}$=$2m_B$ is incoherently added to a flat component interfering with two Breit-Wigner resonances. Not independent of other AUBERT 09E results. Systematic uncertainties not estimated. NODE=M092W;LINKAGE=UB

[17] Assuming four Gaussians with radiative tails and a single step in R. NODE=M092W;LINKAGE=BE

[18] In a coupled-channel model with three resonances and a smooth step in R. NODE=M092W;LINKAGE=LO

$\Upsilon(10860)$ REFERENCES

NODE=M092

YOUR PAPER	SANTEL	16	PR D93 011101	D. Santel *et al.*	(BELLE Collab.)
	CHEN	10	PR D82 091106	K.-F. Chen *et al.*	(BELLE Collab.)
	AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)
	BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)
	LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)

REFID=57121 REFID=53531 REFID=52661 REFID=22368 REFID=22369 NODE=M093

$\Upsilon(11020)$

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

$\Upsilon(11020)$ MASS

NODE=M093M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
YOUR DATA **$10987.5^{+\ 6.4+9.1}_{-\ 2.5-2.3$**	[1] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S, 2S, 3S)\pi^+\pi^-$

NODE=M093M OCCUR=2

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

YOUR DATA 11003.0± 1.1$^{+0.9}_{-1.0}$	[2,3] SANTEL	16	BELL	e^+e^-	→ hadrons
10996 ± 2	[4] AUBERT	09E	BABR	e^+e^-	→ hadrons
11019 ± 5 ±7	BESSON	85	CLEO	e^+e^-	→ hadrons
11020 ±30	LOVELOCK	85	CUSB	e^+e^-	→ hadrons

YOUR NOTE [1] From a simultaneous fit to the $\Upsilon(nS)\pi^+\pi^-$, n = 1, 2, 3 cross sections at 25 energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with fourteen resonance parameters (a mass, width, and three amplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relative phase, and three decoherence coefficients, one for each n). Continuum contributions were measured (and therefore fixed) to be zero. NODE=M093M;LINKAGE=C

YOUR NOTE [2] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M093M;LINKAGE=A

YOUR NOTE [3] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M093M;LINKAGE=B

[4] In a model where a flat non-resonant $b\bar{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated. NODE=M093M;LINKAGE=AU

$\Upsilon(11020)$ WIDTH

NODE=M093W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
YOUR DATA **$61\ ^{+\ 9}_{-19}\ ^{+\ 2}_{-20}$**	[5] SANTEL	16	BELL	$e^+e^- \to \Upsilon(1S, 2S, 3S)\pi^+\pi^-$

NODE=M093W OCCUR=2

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

YOUR DATA

$39.3^{+\ 1.7+\ 1.3}_{-\ 1.6-\ 2.4}$	[6,7] SANTEL	16	BELL	$e^+e^- \to$	hadrons	
37 ± 3	[8] AUBERT	09E	BABR	$e^+e^- \to$	hadrons	
61 ±13 ±22	BESSON	85	CLEO	$e^+e^- \to$	hadrons	
90 ±20	LOVELOCK	85	CUSB	$e^+e^- \to$	hadrons	

YOUR NOTE

[5] From a simultaneous fit to the $\Upsilon(\mathrm{nS})\pi^+\pi^-$, n=1, 2, 3 cross sections at 25 energy points within $\sqrt{s}$ = 10.6–11.05 GeV to a pair of interfering Breit-Wigner amplitudes modified by phase space factors, with fourteen resonance parameters (a mass, width, and three amplitudes for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, a single universal relative phase, and three decoherence coefficients, one for each n). Continuum contributions were measured (and therefore fixed) to be zero. NODE=M093W;LINKAGE=C

YOUR NOTE

[6] From a fit to the total hadronic cross sections measured at 60 energy points within $\sqrt{s}$ = 10.82–11.05 GeV to a pair of interfering Breit-Wigner amplitudes and two floating continuum amplitudes with $1/\sqrt{s}$ dependence, one coherent with the resonances and one incoherent, with six resonance parameters (a mass, width, and an amplitude for each of $\Upsilon(10860)$ and $\Upsilon(11020)$, one relative phase, and one decoherence coefficient). NODE=M093W;LINKAGE=A

YOUR NOTE

[7] Not including uncertain and potentially large systematic errors due to assumed continuum amplitude $1/\sqrt{s}$ dependence and related interference contributions. NODE=M093W;LINKAGE=B

[8] In a model where a flat non-resonant $b\bar{b}$-continuum is incoherently added to a second flat component interfering with two Breit-Wigner resonances. Systematic uncertainties not estimated. NODE=M093W;LINKAGE=AU

$\Upsilon(11020)$ REFERENCES

NODE=M093

YOUR PAPER

SANTEL	16	PR D93 011101	D. Santel *et al.*	(BELLE Collab.)	REFID=57121
AUBERT	09E	PRL 102 012001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52661
BESSON	85	PRL 54 381	D. Besson *et al.*	(CLEO Collab.)	REFID=22368
LOVELOCK	85	PRL 54 377	D.M.J. Lovelock *et al.*	(CUSB Collab.)	REFID=22369