Reference = TAMPONI 15; PRL 115 142001
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=M171

$\eta_b(1S)$

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

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions. Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$.

NODE=M171

$\eta_b(1S)$ MASS

NODE=M171M

NODE=M171M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	9399.0± 2.3 OUR AVERAGE		Error includes scale factor of 1.6. See the ideogram below.			
YOUR DATA	9400.7± 1.7± 1.6	33.1k	TAMPONI	15	BELL	$e^+e^- \to \eta_b(1S)\gamma\eta$
	9402.4± 1.5± 1.8	34k	[1] MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^-$ + hadrons
	9391.8± 6.6± 2.0	2.3k	[2] BONVICINI	10	CLEO	$\Upsilon(3S) \to \gamma X$
	$9394.2^{+4.8}_{-4.9} \pm 2.0$	13k	[2] AUBERT	09AQ	BABR	$\Upsilon(2S) \to \gamma X$
	$9388.9^{+3.1}_{-2.3} \pm 2.7$	19k	[2] AUBERT	08V	BABR	$\Upsilon(3S) \to \gamma X$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	9393.2± 3.4± 2.3	10	[2,3] DOBBS	12		$\Upsilon(2S) \to \gamma$ hadrons
	9300 ±20 ±20		HEISTER	02D	ALEP	181–209 e^+e^-

[1] With floating width. Not independent of the corresponding mass difference measurement. NODE=M171M;LINKAGE=MI

[2] Assuming $\Gamma_{\eta_b(1S)} = 10$ MeV. Not independent of the corresponding γ energy or mass difference measurements. NODE=M171M;LINKAGE=AU

[3] Obtained by analyzing CLEO III data but not authored by the CLEO Collaboration. NODE=M171M;LINKAGE=DO

$\eta_b(1S)$ WIDTH

NODE=M171W

NODE=M171W

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	10^{+5}_{-4} OUR AVERAGE					
YOUR DATA	$8^{+6}_{-5} \pm 5$	33.1k	TAMPONI	15	BELL	$e^+e^- \to \eta_b(1S)\gamma\eta$
	$10.8^{+4.0}_{-3.7}{}^{+4.5}_{-2.0}$	34k	[9] MIZUK	12	BELL	$e^+e^- \to \gamma\pi^+\pi^-$ + hadrons

[9] With floating mass. NODE=M171W;LINKAGE=MI

$\eta_b(1S)$ REFERENCES

NODE=M171

YOUR PAPER	TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.) REFID=56996
	DOBBS	12	PRL 109 082001	S. Dobbs *et al.*	REFID=54288
	MIZUK	12	PRL 109 232002	R. Mizuk *et al.*	(BELLE Collab.) REFID=54718
	BONVICINI	10	PR D81 031104	G. Bonvicini *et al.*	(CLEO Collab.) REFID=53231
	AUBERT	09AQ	PRL 103 161801	B. Aubert *et al.*	(BABAR Collab.) REFID=53106
	AUBERT	08V	PRL 101 071801	B. Aubert *et al.*	(BABAR Collab.) REFID=52262
	HEISTER	02D	PL B530 56	A. Heister *et al.*	(ALEPH Collab.) REFID=48577

NODE=M204

$h_b(1P)$

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

Quantum numbers are quark model predictions, $C = -$ established by $\eta_b\gamma$ decay.

NODE=M204

$h_b(1P)$ MASS

NODE=M204M

NODE=M204M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	9899.3±0.8 OUR AVERAGE					
YOUR DATA	9899.3±0.4±1.0	112k	TAMPONI	15	BELL	$e^+e^- \to h_b(1P)\eta$
	9899.1±0.4±1.0	70k	MIZUK	12	BELL	$e^+e^- \to \pi^+\pi^-$ hadrons
	9902 ±4 ±2	10.8k	LEES	11K	BABR	$\Upsilon(3S) \to \eta_b\gamma\pi^0$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	$9898.2^{+1.1}_{-1.0}{}^{+1.0}_{-1.1}$	50.0k	[1] ADACHI	12	BELL	10.86 $e^+e^- \to \pi^+\pi^-$ MM

[1] Superseded by MIZUK 12. NODE=M204M;LINKAGE=AD

$h_b(1P)$ BRANCHING RATIOS

NODE=M204225

$\Gamma(\eta_b(1S)\gamma)/\Gamma_{total}$ — Γ_1/Γ

NODE=M204R01
NODE=M204R01

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$52\ ^{+6}_{-5}$ OUR AVERAGE					
YOUR DATA $56 \pm 8 \pm 4$	33.1k	[1] TAMPONI	15	BELL	$e^+e^- \to \eta_b(1S)\gamma\eta$
$49.2 \pm 5.7\ ^{+5.6}_{-3.3}$	24k	MIZUK	12	BELL	$e^+e^- \to (\gamma)\pi^+\pi^-$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	10.8k	LEES	11K	BABR	$\Upsilon(3S) \to \eta_b\gamma\pi^0$

YOUR NOTE [1] Using B($\eta \to 2\gamma$) = (39.41 ± 0.20)%. NODE=M204R01;LINKAGE=A

$h_b(1P)$ REFERENCES

NODE=M204

YOUR PAPER

TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)
ADACHI	12	PRL 108 032001	I. Adachi *et al.*	(BELLE Collab.)
MIZUK	12	PRL 109 232002	R. Mizuk *et al.*	(BELLE Collab.)
LEES	11K	PR D84 091101	J.P. Lees *et al.*	(BABAR Collab.)

REFID=56996
REFID=53962
REFID=54718
REFID=53937
NODE=M047

$\Upsilon(4S)$ or $\Upsilon(10580)$

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

$\Upsilon(4S)$ BRANCHING RATIOS

NODE=M047230

non-$B\overline{B}$ DECAYS

NODE=M047NBB

$\Gamma(\Upsilon(1S)\eta)/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M047R18
NODE=M047R18

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.96±0.26±0.09		56	[24] AUBERT	08BP	BABR	$\Upsilon(4S) \to \pi^+\pi^-\pi^0\ell^+\ell^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
YOUR DATA <2.7	90		[25] TAMPONI	15	BELL	$e^+e^- \to \Upsilon(1S)\eta$

[24] Using B($\Upsilon(1S) \to e^+e^-$) = (2.38 ± 0.11)% and B($\Upsilon(1S) \to \mu^+\mu^-$) = (2.48 ± 0.05)%. NODE=M047R18;LINKAGE=UB

YOUR NOTE [25] Using B($\eta \to 2\gamma$) = (39.41 ± 0.20)%. NODE=M047R18;LINKAGE=A

$\Gamma(h_b(1P)\eta)/\Gamma_{total}$ — Γ_{22}/Γ

NODE=M047R00
NODE=M047R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **2.18±0.11±0.18**	112k	[31] TAMPONI	15	BELL	$e^+e^- \to h_b(1P)\eta$

YOUR NOTE [31] Using B($\eta \to 2\gamma$) = (39.41 ± 0.20)%. NODE=M047R00;LINKAGE=A

$\Upsilon(4S)$ REFERENCES

NODE=M047

YOUR PAPER

TAMPONI	15	PRL 115 142001	U. Tamponi *et al.*	(BELLE Collab.)
AUBERT	08BP	PR D78 112002	B. Aubert *et al.*	(BABAR Collab.)

REFID=56996
REFID=52660