Reference = GARMASH 16; PRL 116 212001
Verifier code = BELLE

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

Karim Trabelsi

EMAIL: karim.trabelsi@kek.jp

March 20, 2017

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

$b\overline{b}$ MESONS

NODE=MXXX030

$X(10610)^{\pm}$

NODE=M207

$I^G(J^P) = 1^+(1^+)$

Observed by BONDAR 12 in $\Upsilon(5S)$ decays to $\Upsilon(nS)\pi^+\pi^-$ (n = 1, 2, 3) and $h_b(mP)\pi^+\pi^-$ (m = 1, 2). $J^P = 1^+$ is favored from angular analyses. Isospin = 1 is favored due to observation by KROKOVNY 13 of a corresponding neutral state produced in $\Upsilon(10860) \to \Upsilon(2S)/\Upsilon(3S)\pi^0\pi^0$ decays at a consistent mass.

NODE=M207

$X(10610)^{\pm}$ BRANCHING RATIOS

NODE=M207225

$\Gamma(\Upsilon(1S)\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M207R01
NODE=M207R01

	VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
YOUR DATA	$5.4^{+1.6}_{-1.3}{}^{+1.1}_{-0.8}$	[7] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- \overline{B}{}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$
seen		BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$

YOUR NOTE [7] Assuming the $X(10610)^{\pm}$ decay width is saturated by the channels $\pi^+\Upsilon(1S, 2S, 3S)$, $\pi^+ h_b(1P, 2P)$, and $B^+\overline{B}{}^{*0} + \overline{B}{}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R01;LINKAGE=A

$\Gamma(\Upsilon(2S)\pi^+)/\Gamma_{total}$ Γ_2/Γ

NODE=M207R02
NODE=M207R02

	VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
YOUR DATA	$3.62^{+0.76}_{-0.59}{}^{+0.79}_{-0.53}$	[8] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- \overline{B}{}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$
seen		BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$

YOUR NOTE [8] Assuming the $X(10610)^{\pm}$ decay width is saturated by the channels $\pi^+\Upsilon(1S, 2S, 3S)$, $\pi^+ h_b(1P, 2P)$, and $B^+\overline{B}{}^{*0} + \overline{B}{}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R02;LINKAGE=A

$\Gamma(\Upsilon(3S)\pi^+)/\Gamma_{total}$ Γ_3/Γ

NODE=M207R03
NODE=M207R03

	VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
YOUR DATA	$2.15^{+0.55}_{-0.42}{}^{+0.60}_{-0.43}$	[9] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- \overline{B}{}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$
seen		BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$

YOUR NOTE [9] Assuming the $X(10610)^{\pm}$ decay width is saturated by the channels $\pi^+\Upsilon(1S, 2S, 3S)$, $\pi^+ h_b(1P, 2P)$, and $B^+\overline{B}{}^{*0} + \overline{B}{}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R03;LINKAGE=A

$\Gamma(h_b(1P)\pi^+)/\Gamma_{total}$ Γ_4/Γ

NODE=M207R04
NODE=M207R04

	VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
YOUR DATA	$3.45^{+0.87}_{-0.71}{}^{+0.86}_{-0.63}$	[10] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- \overline{B}{}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen		[11] MIZUK	16	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$
seen		[12] BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$

YOUR NOTE [10] Assuming the $X(10610)^{\pm}$ decay width is saturated by the channels $\pi^+\Upsilon(1S, 2S, 3S)$, $\pi^+ h_b(1P, 2P)$, and $B^+\overline{B}{}^{*0} + \overline{B}{}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.

NODE=M207R04;LINKAGE=C

[11] Using e^+e^- energies near the $\Upsilon(11020)$.

NODE=M207R04;LINKAGE=A

[12] Using e^+e^- energies near the $\Upsilon(10860)$.

NODE=M207R04;LINKAGE=B

$\Gamma(h_b(2P)\pi^+)/\Gamma_{total}$ Γ_5/Γ

NODE=M207R05
NODE=M207R05

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
YOUR DATA **$4.67^{+1.24}_{-1.00}{}^{+1.18}_{-0.89}$**	[13] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- \overline{B}{}^0 B^{*+}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	[14] MIZUK	16	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$
seen	[15] BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$

YOUR NOTE
[13] Assuming the $X(10610)^\pm$ decay width is saturated by the channels $\pi^+\,\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}{}^{*0} + \overline{B}{}^0 B^{*+}$, and using the results from BONDAR 12 and MIZUK 16.
NODE=M207R05;LINKAGE=C

[14] Using e^+e^- energies near the $\Upsilon(11020)$.
NODE=M207R05;LINKAGE=A

[15] Using e^+e^- energies near the $\Upsilon(10860)$.
NODE=M207R05;LINKAGE=B

$\Gamma(B^+\overline{B}{}^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M207R08
NODE=M207R08

VALUE	DOCUMENT ID		TECN	COMMENT
YOUR DATA **not seen**	GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^0$

$[\Gamma(B^+\overline{B}{}^{*0}) + \Gamma(B^{*+}\overline{B}{}^0)]/\Gamma_{total}$ Γ_7/Γ

NODE=M207R00
NODE=M207R00

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **$85.6^{+1.5}_{-2.0}{}^{+1.5}_{-2.1}$**	357	[16] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- B^{*+} \overline{B}{}^0$

YOUR NOTE
[16] Assuming the $X(10610)^\pm$ decay width is saturated by the channels $\pi^+\,\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}{}^{*0} + B^{*+}\overline{B}{}^0$, and using the results from BONDAR 12 and MIZUK 16. Using the mass and width of the $X(10610)^\pm$ from BONDAR 12.
NODE=M207R00;LINKAGE=A

$\Gamma(B^{*+}\overline{B}{}^{*0})/\Gamma_{total}$ Γ_8/Γ

NODE=M207R06
NODE=M207R06

VALUE	DOCUMENT ID		TECN	COMMENT
YOUR DATA **not seen**	GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+} \overline{B}{}^{*0}$

$[\Gamma(B^+\overline{B}{}^{*0}) + \Gamma(B^{*+}\overline{B}{}^0)]/[\Gamma(\Upsilon(1S)\pi^+) + \Gamma(\Upsilon(2S)\pi^+) + \Gamma(\Upsilon(3S)\pi^+) + \Gamma(h_b(1P)\pi^+) + \Gamma(h_b(2P)\pi^+)]$ $\Gamma_7/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M207R07
NODE=M207R07

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA $5.93^{+0.99}_{-0.69}{}^{+1.01}_{-0.73}$	357	[17] GARMASH	16	BELL	$e^+e^- \to \pi^- B^+ \overline{B}{}^{*0}$, $\pi^- \overline{B}{}^0 B^{*+}$

YOUR NOTE
[17] Combined with the results of BONDAR 12 and MIZUK 16. Not independent from $X(10610)^\pm$ branching fractions to $\pi^+\,\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^+\overline{B}{}^{*0} + \overline{B}{}^0 B^{*+}$.
NODE=M207R07;LINKAGE=A

$X(10610)^\pm$ REFERENCES

NODE=M207

YOUR PAPER

GARMASH	16	PRL 116 212001	A. Garmash *et al.*	(BELLE Collab.)
MIZUK	16	PRL 117 142001	R. Mizuk *et al.*	(BELLE Collab.)
GARMASH	15	PR D91 072003	A. Garmash *et al.*	(BELLE Collab.)
KROKOVNY	13	PR D88 052016	P. Krokovny *et al.*	(BELLE Collab.)
BONDAR	12	PRL 108 122001	A. Bondar *et al.*	(BELLE Collab.)

REFID=57446
REFID=57465
REFID=56811
REFID=55588
REFID=53963
NODE=M208

$X(10650)^\pm$

$I^G(J^P) = ?^+(1^+)$

OMITTED FROM SUMMARY TABLE

Observed by BONDAR 12 in $\Upsilon(5S)$ decays to $\Upsilon(\mathrm{nS})\pi^+\pi^-$ (n = 1, 2, 3) and $h_b(\mathrm{mP})\pi^+\pi^-$ (m = 1, 2). $J^P = 1^+$ is favored from angular analyses.
NODE=M208

$X(10650)^\pm$ BRANCHING RATIOS

NODE=M208225

$\Gamma(\Upsilon(1S)\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M208R01
NODE=M208R01

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
YOUR DATA **$1.7^{+0.7}_{-0.6}{}^{+0.3}_{-0.2}$**	[7] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+} \overline{B}{}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	GARMASH	15	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$
seen	BONDAR	12	BELL	$e^+e^- \to \Upsilon(1S)\pi^+\pi^-$

YOUR NOTE [7] Assuming the $X(10650)^{\pm}$ decay width is saturated by the channels $\pi^+ \Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R01;LINKAGE=A

$\Gamma(\Upsilon(2S)\pi^+)/\Gamma_{total}$ Γ_2/Γ

NODE=M208R02
NODE=M208R02

VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT
YOUR DATA **$1.39^{+0.48}_{-0.38}{}^{+0.34}_{-0.23}$**	[8]	GARMASH	16		$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		GARMASH	15	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$
seen		BONDAR	12	BELL	$e^+e^- \to \Upsilon(2S)\pi^+\pi^-$

YOUR NOTE [8] Assuming the $X(10650)^{\pm}$ decay width is saturated by the channels $\pi^+ \Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R02;LINKAGE=A

$\Gamma(\Upsilon(3S)\pi^+)/\Gamma_{total}$ Γ_3/Γ

NODE=M208R03
NODE=M208R03

VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT
YOUR DATA **$1.63^{+0.53}_{=0.42}{}^{+0.39}_{=0.28}$**	[9]	GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen		GARMASH	15	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$
seen		BONDAR	12	BELL	$e^+e^- \to \Upsilon(3S)\pi^+\pi^-$

YOUR NOTE [9] Assuming the $X(10650)^{\pm}$ decay width is saturated by the channels $\pi^+ \Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R03;LINKAGE=A

$\Gamma(h_b(1P)\pi^+)/\Gamma_{total}$ Γ_4/Γ

NODE=M208R04
NODE=M208R04

VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT
YOUR DATA **$8.41^{+2.43}_{-2.12}{}^{+1.49}_{-1.06}$**	[10]	GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	[11]	MIZUK	16	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$
seen	[12]	BONDAR	12	BELL	$e^+e^- \to h_b(1P)\pi^+\pi^-$

YOUR NOTE [10] Assuming the $X(10650)^{\pm}$ decay width is saturated by the channels $\pi^+ \Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R04;LINKAGE=C

[11] Using e^+e^- energies near the $\Upsilon(11020)$. NODE=M208R04;LINKAGE=A

[12] Using e^+e^- energies near the $\Upsilon(10860)$. NODE=M208R04;LINKAGE=B

$\Gamma(h_b(2P)\pi^+)/\Gamma_{total}$ Γ_5/Γ

NODE=M208R05
NODE=M208R05

VALUE (units 10^{-2})		DOCUMENT ID		TECN	COMMENT
YOUR DATA **$14.7^{+3.2}_{-2.8}{}^{+2.8}_{-2.3}$**	[13]	GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
possibly seen	[14]	MIZUK	16	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$
seen	[15]	BONDAR	12	BELL	$e^+e^- \to h_b(2P)\pi^+\pi^-$

YOUR NOTE [13] Assuming the $X(10650)^{\pm}$ decay width is saturated by the channels $\pi^+ \Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. NODE=M208R05;LINKAGE=C

[14] Using e^+e^- energies near the $\Upsilon(11020)$. NODE=M208R05;LINKAGE=A

[15] Using e^+e^- energies near the $\Upsilon(10860)$. NODE=M208R05;LINKAGE=B

$\Gamma(B^+\overline{B}^0)/\Gamma_{total}$ Γ_6/Γ

NODE=M208R08
NODE=M208R08

VALUE	DOCUMENT ID		TECN	COMMENT
YOUR DATA **not seen**	GARMASH	16	BELL	$e^+e^- \to \pi^- B^+\overline{B}^0$

$[\Gamma(B^+\overline{B}^{*0}) + \Gamma(B^{*+}\overline{B}^0)]/\Gamma_{total}$ Γ_7/Γ

NODE=M208R00
NODE=M208R00

VALUE	DOCUMENT ID		TECN	COMMENT
YOUR DATA **not seen**	GARMASH	16	BELL	$e^+e^- \to \pi^- B^+\overline{B}^{*0}$, $\pi^-\overline{B}^0 B^{*+}$

$\Gamma(B^{*+}\overline{B}^{*0})/\Gamma_{total}$ Γ_8/Γ

NODE=M208R06
NODE=M208R06

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **$73.7^{+3.4}_{-4.4}{}^{+2.7}_{-3.5}$**	161	[16] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$

YOUR NOTE [16] Assuming the $X(10650)^{\pm}$ decay width is saturated by the channels $\pi^+ \Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$, and using the results from BONDAR 12 and MIZUK 16. Using the mass and width of the $X(10650)^{\pm}$ from BONDAR 12. NODE=M208R06;LINKAGE=A

$\Gamma(B^{*+}\overline{B}^{*0})/[\Gamma(\Upsilon(1S)\pi^+)+\Gamma(\Upsilon(2S)\pi^+)+\Gamma(\Upsilon(3S)\pi^+)+\Gamma(h_b(1P)\pi^+)+\Gamma(h_b(2P)\pi^+)]$ $\Gamma_8/(\Gamma_1+\Gamma_2+\Gamma_3+\Gamma_4+\Gamma_5)$

NODE=M208R07
NODE=M208R07

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT

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

YOUR DATA	$2.80^{+0.69}_{-0.40}{}^{+0.54}_{-0.36}$	161	[17] GARMASH	16	BELL	$e^+e^- \to \pi^- B^{*+}\overline{B}^{*0}$	

YOUR NOTE [17] Combined with the results of BONDAR 12 and MIZUK 16. Not independent from $X(10650)^{\pm}$ branching fractions to $\pi^+\,\Upsilon(1S,2S,3S)$, $\pi^+ h_b(1P,2P)$, and $B^{*+}\overline{B}^{*0}$.

NODE=M208R07;LINKAGE=A

$X(10650)^{\pm}$ REFERENCES

NODE=M208

YOUR PAPER	GARMASH	16	PRL 116 212001	A. Garmash *et al.*	(BELLE Collab.)	REFID=57446
	MIZUK	16	PRL 117 142001	R. Mizuk *et al.*	(BELLE Collab.)	REFID=57465
	GARMASH	15	PR D91 072003	A. Garmash *et al.*	(BELLE Collab.)	REFID=56811
	BONDAR	12	PRL 108 122001	A. Bondar *et al.*	(BELLE Collab.)	REFID=53963