Reference = ABLIKIM 15T; PRL 115 091803
Verifier code = BES3

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

Xiao-Rui Lyu

EMAIL: xiaorui@ucas.ac.cn

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

LIGHT UNFLAVORED MESONS ($S = C = B = 0$)

NODE=MXXX005

For $I = 1$ (π, b, ρ, a): $u\overline{d}$, $(u\overline{u}-d\overline{d})/\sqrt{2}$, $d\overline{u}$;
for $I = 0$ (η, η', h, h', ω, ϕ, f, f'): $c_1(u\overline{u} + d\overline{d}) + c_2(s\overline{s})$

NODE=MXXX005

NODE=M175

$\eta(1475)$

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

See also the $\eta(1405)$.

NODE=M175

$\eta(1475)$ MASS

NODE=M175205

$K\overline{K}\pi$ MODE ($K^*(892)$ K dominant)

NODE=M175M5
NODE=M175M5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1476± 4 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
1469±14±13	74	ACHARD	07	L3	183–209 $e^+e^- \to e^+e^- K^0_S K^\pm\pi^\mp$
1460±19	3651	NICHITIU	02	OBLX	
1485± 8± 5	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$
1500±10		CICALO	99	OBLX	0 $\overline{p}p \to K^\pm K^0_S \pi^\mp\pi^+\pi^-$
1464±10		BERTIN	97	OBLX	0 $\overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$ OCCUR=2
1460±10		BERTIN	95	OBLX	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$ OCCUR=2
$1490^{+14}_{-8}{}^{+3}_{-16}$	1100	BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$
1475± 4		RATH	89	MPS	21.4 $\pi^- p \to n K^0_S K^0_S \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 1565± 8 $^{+0}_{-63}$		[1] ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$
1421±14		AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$ OCCUR=2

YOUR NOTE [1] Could also be the $\eta(1405)$. NODE=M175M5;LINKAGE=A

$\eta(1475)$ WIDTH

NODE=M175210

$K\overline{K}\pi$ MODE ($K^*(892)$ K dominant)

NODE=M175W5
NODE=M175W5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
85± 9 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
67±18± 7	74	ACHARD	07	L3	183–209 $e^+e^- \to e^+e^- K^0_S K^\pm\pi^\mp$
120±19	3651	NICHITIU	02	OBLX	
98±18± 3	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$
100±20		CICALO	99	OBLX	0 $\overline{p}p \to K^\pm K^0_S \pi^\mp\pi^+\pi^-$
105±15		BERTIN	97	OBLX	0.0 $\overline{p}p \to K^\pm(K^0)\pi^\mp\pi^+\pi^-$ OCCUR=2
105±15		BERTIN	95	OBLX	0 $\overline{p}p \to K\overline{K}\pi\pi\pi$ OCCUR=2
63±18		AUGUSTIN	92	DM2	$J/\psi \to \gamma K\overline{K}\pi$ OCCUR=2
$54^{+37}_{-21}{}^{+13}_{-24}$		BAI	90C	MRK3	$J/\psi \to \gamma K^0_S K^\pm\pi^\mp$
51±13		RATH	89	MPS	21.4 $\pi^- p \to n K^0_S K^0_S \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA $54^{+14}_{-13}{}^{+21}_{-28}$		[1] ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$

YOUR NOTE [1] Could also be the $\eta(1405)$. NODE=M175W5;LINKAGE=A

$\eta(1475)$ REFERENCES

NODE=M175

YOUR PAPER ABLIKIM	15T	PRL 115 091803	M. Ablikim *et al.*	(BES III Collab.)	REFID=56785
ACHARD	07	JHEP 0703 018	P. Achard *et al.*	(L3 Collab.)	REFID=51698
NICHITIU	02	PL B545 261	F. Nichitiu *et al.*	(OBELIX Collab.)	REFID=48848
ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
CICALO	99	PL B462 453	C. Cicalo *et al.*	(OBELIX Collab.)	REFID=47394
BERTIN	97	PL B400 226	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45417
BERTIN	95	PL B361 187	A. Bertin *et al.*	(OBELIX Collab.)	REFID=44614
AUGUSTIN	92	PR D46 1951	J.E. Augustin, G. Cosme	(DM2 Collab.)	REFID=41584
BAI	90C	PRL 65 2507	Z. Bai *et al.*	(Mark III Collab.)	REFID=41578
RATH	89	PR D40 693	M.G. Rath *et al.*	(NDAM, BRAN, BNL, CUNY+)	REFID=40924

NODE=M085

$X(1835)$

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

OMITTED FROM SUMMARY TABLE

Could be a superposition of two states, one with small width appearing as threshold enhancement in $p\bar{p}$, the other one with a larger width, decaying into $\pi^+\pi^-\eta'$ and $K^0_S K^0_S \eta$. For the former ABLIKIM 12D determine $J^{PC} = 0^{-+}$.

NODE=M085

$X(1835)$ MASS

NODE=M085M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$1835.8^{+\ 4.0}_{-\ 3.2}$ OUR AVERAGE					
YOUR DATA $1844 \pm 9\ ^{+16}_{-25}$		ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$
$1836.5 \pm 3.0\ ^{+\ 5.6}_{-\ 2.1}$	4265	[1] ABLIKIM	11C	BES3	$J/\psi \to \gamma \pi^+\pi^-\eta'$
$1833.7 \pm 6.1 \pm 2.7$	264	ABLIKIM	05R	BES2	$J/\psi \to \gamma \pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1832\ ^{+19}_{-\ 5} \pm 26$		[2] ABLIKIM	12D	BES3	$J/\psi \to \gamma p\bar{p}$
$1877.3 \pm 6.3\ ^{+\ 3.4}_{-\ 7.4}$		[3] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
$1837\ ^{+10}_{-12}\ ^{+\ 9}_{-\ 7}$	231	[4,5] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\bar{p}$
1831 ± 7		[5,6] ABLIKIM	05R	BES2	$J/\psi \to \gamma p\bar{p}$ OCCUR=2
$1859\ ^{+\ 3}_{-10}\ ^{+\ 5}_{-25}$		[5] BAI	03F	BES2	$J/\psi \to \gamma p\bar{p}$

[1] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\bar{p}) < 2.8$ GeV, and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$. NODE=M085M;LINKAGE=AI

[2] From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A. Supersedes ABLIKIM 10G. NODE=M085M;LINKAGE=AK

[3] The selected process is $J/\psi \to \omega a_0(980)\pi$. This state may be due also to $\eta_2(1870)$ or to a combination of $X(1835)$ and $\eta_2(1870)$. NODE=M085M;LINKAGE=BL

[4] From a fit of the $p\bar{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R) = 2100$ MeV and $\Gamma(R) = 160$ MeV, and $\gamma p\bar{p}$ phase space, for $M(p\bar{p}) < 2.85$ GeV. NODE=M085M;LINKAGE=AE

[5] Evidence for a threshold enhancement in the $p\bar{p}$ mass spectrum was also reported by ABE 02K, AUBERT,B 05L, and WANG 05A in $B^+ \to p\bar{p}K^+$, WANG 05A in $B^0 \to p\bar{p}K^0_S$, ABE 02W in $\overline{B}{}^0 \to p\bar{p}D^0$, DEL-AMO-SANCHEZ 12 in $B \to D(D^*)p\bar{p}(\pi)$, and WEI 08 in $B^+ \to p\bar{p}\pi^+$ decays. Not seen by ATHAR 06 in $\Upsilon(1S) \to p\bar{p}\gamma$. NODE=M085M;LINKAGE=HF

[6] From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A. Systematic errors not estimated. NODE=M085M;LINKAGE=AB

$X(1835)$ WIDTH

NODE=M085W

VALUE (MeV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
112 ± 40 OUR AVERAGE Error includes scale factor of 2.4. See the ideogram below.						
YOUR DATA $192\ ^{+20}_{-17}\ ^{+62}_{-43}$			ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$
$190 \pm 9\ ^{+38}_{-36}$		4265	[1] ABLIKIM	11C	BES3	$J/\psi \to \gamma \pi^+\pi^-\eta'$
$67.7 \pm 20.3 \pm 7.7$		264	ABLIKIM	05R	BES2	$J/\psi \to \gamma \pi^+\pi^-\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 76	90		[2] ABLIKIM	12D	BES3	$J/\psi \to \gamma p\bar{p}$
$57 \pm 12\ ^{+19}_{-\ 4}$			[3] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
$0\ ^{+44}_{-\ 0}$		231	[4,5] ALEXANDER	10	CLEO	$J/\psi \to \gamma p\bar{p}$
< 153	90		[5,6] ABLIKIM	05R	BES2	$J/\psi \to \gamma p\bar{p}$ OCCUR=2
< 30			[5] BAI	03F	BES2	$J/\psi \to \gamma p\bar{p}$

[1] From a fit of the $\pi^+\pi^-\eta'$ mass distribution to a combination of $\gamma f_1(1510)$, $\gamma X(1835)$, and two unconfirmed states $\gamma X(2120)$, and $\gamma X(2370)$, for $M(p\bar{p}) < 2.8$ GeV, and accounting for backgrounds from non-η' events and $J/\psi \to \pi^0\pi^+\pi^-\eta'$. NODE=M085W;LINKAGE=AI

[2] From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A. Supersedes ABLIKIM 10G. NODE=M085W;LINKAGE=AK

[3] The selected process is $J/\psi \to \omega a_0(980)\pi$. This state may be due also to $\eta_2(1870)$ or to a combination of $X(1835)$ and $\eta_2(1870)$. NODE=M085W;LINKAGE=BL

[4] From a fit of the $p\overline{p}$ mass distribution to a combination of $\gamma X(1835)$, γR with $M(R) = 2100$ MeV and $\Gamma(R) = 160$ MeV, and $\gamma p\overline{p}$ phase space, for $M(p\overline{p}) < 2.85$ GeV. NODE=M085W;LINKAGE=AE

[5] Evidence for a threshold enhancement in the $p\overline{p}$ mass spectrum was also reported by ABE 02K, AUBERT,B 05L, and WANG 05A in $B^+ \to p\overline{p}K^+$, WANG 05A in $B^0 \to p\overline{p}K^0_S$, ABE 02W in $\overline{B}^0 \to p\overline{p}D^0$, DEL-AMO-SANCHEZ 12 in $B \to D(D^*)p\overline{p}(\pi)$, and WEI 08 in $B^+ \to p\overline{p}\pi^+$ decays. Not seen by ATHAR 06 in $\Upsilon(1S) \to p\overline{p}\gamma$. NODE=M085W;LINKAGE=HF

[6] From the fit including final state interaction effects in isospin 0 S-wave according to SIBIRTSEV 05A. Systematic errors not estimated. NODE=M085W;LINKAGE=AB

$X(1835)$ BRANCHING RATIOS

NODE=M085220

$\Gamma(\eta'\pi^+\pi^-)/\Gamma(K^0_S K^0_S \eta)$ Γ_2/Γ_4

NODE=M085R00

VALUE	DOCUMENT ID	TECN	COMMENT

NODE=M085R00

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

YOUR DATA	6.7 ± 1.8	[1] ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$

YOUR NOTE [1] Using resutls from ABLIKIM 05R. NODE=M085R00;LINKAGE=A

$X(1835)$ REFERENCES

NODE=M085

YOUR PAPER	ABLIKIM	15T	PRL 115 091803	M. Ablikim *et al.*	(BES III Collab.)	REFID=56785
	ABLIKIM	12D	PRL 108 112003	M. Ablikim *et al.*	(BES III Collab.) JPC	REFID=54269
	DEL-AMO-SA...	12	PR D85 092017	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=54286
	ABLIKIM	11C	PRL 106 072002	M. Ablikim *et al.*	(BES III Collab.)	REFID=53684
	ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BES III Collab.)	REFID=53931
	ABLIKIM	10G	CPC 34 421	M. Ablikim *et al.*	(BES III Collab.)	REFID=55685
	ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=53525
	WEI	08	PL B659 80	J.-T. Wei *et al.*	(BELLE Collab.)	REFID=52086
	ATHAR	06	PR D73 032001	S.B. Athar *et al.*	(CLEO Collab.)	REFID=50993
	ABLIKIM	05R	PRL 95 262001	M. Ablikim *et al.*	(BES Collab.)	REFID=50985
	AUBERT,B	05L	PR D72 051101	B. Aubert *et al.*	(BABAR Collab.)	REFID=50827
	SIBIRTSEV	05A	PR D71 054010	A. Sibirtsev, J. Haidenbauer		REFID=51038
	WANG	05A	PL B617 141	M.-Z. Wang *et al.*	(BELLE Collab.)	REFID=50651
	BAI	03F	PRL 91 022001	J.Z. Bai *et al.*	(BES II Collab.)	REFID=49473
	ABE	02K	PRL 88 181803	K. Abe *et al.*	(BELLE Collab.)	REFID=48690
	ABE	02W	PRL 89 151802	K. Abe *et al.*	(BELLE Collab.)	REFID=48980

$c\overline{c}$ MESONS

NODE=MXXX025

NODE=M070

$J/\psi(1S)$

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

$J/\psi(1S)$ BRANCHING RATIOS

NODE=M070230

RADIATIVE DECAYS

NODE=M070310

$\Gamma(\gamma X(1835) \to \gamma K^0_S K^0_S \eta)/\Gamma_{\text{total}}$ Γ_{191}/Γ

NODE=M070S96

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT

NODE=M070S96

YOUR DATA	$\mathbf{3.31^{+0.33+1.96}_{-0.30-1.29}}$	ABLIKIM	15T	BES3	$J/\psi \to \gamma K^0_S K^0_S \eta$

$J/\psi(1S)$ REFERENCES

NODE=M070

YOUR PAPER	ABLIKIM	15T	PRL 115 091803	M. Ablikim *et al.*	(BES III Collab.)	REFID=56785