Reference = ACHASOV 16A; PR D93 092001
Verifier code = DRUZHININ

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.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vladimir P. Druzhinin

EMAIL: v.p.druzhinin@inp.nsk.su

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

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=M009

$\rho(770)$

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

$\rho(770)\ \Gamma(e^+e^-)\Gamma(\mathrm{i})/\Gamma^2(\mathrm{total})$

NODE=M009233

$\Gamma(e^+e^-)/\Gamma_{\mathrm{total}} \times \Gamma(\pi^0\gamma)/\Gamma_{\mathrm{total}}$ — **$\Gamma_{12}/\Gamma \times \Gamma_8/\Gamma$**

NODE=M009G2
NODE=M009G2

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
2.22 ±0.26 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
YOUR DATA 1.98 ±0.22 ±0.10		[1] ACHASOV	16A	SND	0.60-1.38 $e^+e^- \to \pi^0\gamma$
2.90 $^{+0.60}_{-0.55}$ ±0.18	18k	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
2.37 ±0.53 ±0.33	36k	[2] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
3.61 ±0.74 ±0.49	10k	[3] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.875±0.026		[4] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-

YOUR NOTE

[1] From the VMD model with the prho(770), $\omega(782)$, $\phi(1020)$ resonances, and an additional resonance describing the total contribution of the $\rho(1450)$ and $\omega(1420)$ states. Supersedes ACHASOV 03.

NODE=M009G2;LINKAGE=B

[2] Using $\sigma_{\phi \to \pi^0\gamma}$ from ACHASOV 00 and m_ρ= 775.97 MeV in the model with the energy-independent phase of ρ-ω interference equal to $(-10.2 \pm 7.0)^\circ$.

NODE=M009G;LINKAGE=SH

[3] Recalculated by us from the cross section in the peak.

NODE=M009G2;LINKAGE=LP

[4] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M009G2;LINKAGE=BE

$\rho(770)$ BRANCHING RATIOS

NODE=M009235

$\Gamma(\pi^0\gamma)/\Gamma_{\mathrm{total}}$ — **Γ_8/Γ**

NODE=M009R9
NODE=M009R9

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 4.20±0.52		[1] ACHASOV	16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
6.21 $^{+1.28}_{-1.18}$ ±0.39	18k	[2,3] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
5.22±1.17±0.75	36k	[3,4] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.8 ±1.7		[5] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$
7.9 ±2.0		[3] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

YOUR NOTE

[1] Using $B(\rho \to e^+e^-)$ from PDG 15. Supersedes ACHASOV 03.

NODE=M009R9;LINKAGE=C

[2] Using $B(\rho \to e^+e^-) = (4.67 \pm 0.09) \times 10^{-5}$.

NODE=M009R9;LINKAGE=AK

[3] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{\mathrm{total}}$.

NODE=M009R9;LINKAGE=BZ

[4] Using $B(\rho \to e^+e^-) = (4.54 \pm 0.10) \times 10^{-5}$.

NODE=M009R9;LINKAGE=AS

[5] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution.

NODE=M009R9;LINKAGE=A

$\rho(770)$ REFERENCES

NODE=M009

YOUR PAPER

ACHASOV	16A	PR D93 092001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57513
PDG	15	RPP 2015 at pdg.lbl.gov		(PDG Collab.)	REFID=56977;ERROR=2
BENAYOUN	10	EPJ C65 211	M. Benayoun *et al.*		REFID=53212
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
ACHASOV	03	PL B559 171	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49187
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561

NODE=M001

$\omega(782)$

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

$\omega(782)\ \Gamma(e^+e^-)\Gamma(i)/\Gamma^2(\text{total})$

NODE=M001225

$\Gamma(e^+e^-)/\Gamma_{\text{total}} \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}$ $\Gamma_9/\Gamma \times \Gamma_2/\Gamma$

NODE=M001G4
NODE=M001G4

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
6.37 ±0.09 OUR AVERAGE					
6.336±0.056±0.089		[1] ACHASOV	16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
6.47 ±0.14 ±0.39	18k	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
6.50 ±0.11 ±0.20	36k	[2] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.34 ±0.21 ±0.21	10k	[3] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
6.80 ±0.13		[4] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-

YOUR DATA

YOUR NOTE

[1] From the VMD model with the interfering $\rho(770)$, $\omega(782)$, $\phi(1020)$, and an additional resonance describing the total contribution of the $\rho(1450)$ and $\omega(1420)$ states. Supersedes ACHASOV 03.

NODE=M001G4;LINKAGE=A

[2] Using $\sigma_{\phi \to \pi^0\gamma}$ from ACHASOV 00 and m_ω= 782.57 MeV in the model with the energy-independent phase of ρ-ω interference equal to $(-10.2 \pm 7.0)^\circ$.

NODE=M001G;LINKAGE=SH

[3] Recalculated by us from the cross section in the peak.

NODE=M001G4;LINKAGE=LP

[4] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.

NODE=M001G4;LINKAGE=BE

$\omega(782)$ BRANCHING RATIOS

NODE=M001220

$\Gamma(\pi^0\gamma)/\Gamma_{\text{total}}$ Γ_2/Γ

NODE=M001R28
NODE=M001R28

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
8.88±0.18		[1] ACHASOV	16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
8.09±0.14		[2] AMBROSINO	08G	KLOE	$e^+e^- \to \pi^+\pi^-2\pi^0$, $2\pi^0\gamma$
9.06±0.20±0.57	18k	[3,4] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
9.34±0.15±0.31	36k	[4] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
8.65±0.16±0.42	1.2M	[5,6] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
8.39±0.24	9k	[7] BENAYOUN	96	RVUE	$e^+e^- \to \pi^0\gamma$
8.88±0.62	10k	[4] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

YOUR DATA

YOUR NOTE

[1] Using B($\omega \to e^+e^-$) from PDG 15. Supersedes ACHASOV 03.

NODE=M001R28;LINKAGE=A

[2] Not independent of $\Gamma(\pi^0\gamma)$ / $\Gamma(\pi^+\pi^-\pi^0)$ from AMBROSINO 08G.

NODE=M001R28;LINKAGE=AM

[3] Using B($\omega \to e^+e^-$)= $(7.14 \pm 0.13) \times 10^{-5}$.

NODE=M001R;LINKAGE=AH

[4] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{\text{total}}$.

NODE=M001R;LINKAGE=VL

[5] Using ACHASOV 03, ACHASOV 03D and B($\omega \to \pi^+\pi^-$) = (1.70 ± 0.28)%.

NODE=M001R28;LINKAGE=VF

[6] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma^2_{\text{total}}$.

NODE=M001R28;LINKAGE=ZL

[7] Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

NODE=M001R28;LINKAGE=A1

$\omega(782)$ REFERENCES

NODE=M001

YOUR PAPER

ACHASOV	16A	PR D93 092001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57513
PDG	15	RPP 2015 at pdg.lbl.gov		(PDG Collab.)	REFID=56977;ERROR=3
BENAYOUN	10	EPJ C65 211	M. Benayoun *et al.*		REFID=53212
AMBROSINO	08G	PL B669 223	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=52573
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
ACHASOV	03	PL B559 171	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49187
ACHASOV	03D	PR D68 052006	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49577
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561

NODE=M004

$\phi(1020)$

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

$\phi(1020)\ \Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M004224

$\Gamma(\pi^0\gamma)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_7/\Gamma \times \Gamma_9/\Gamma$

NODE=M004G3
NODE=M004G3

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
3.87±0.15 OUR AVERAGE					
4.04±0.09±0.19		[1] ACHASOV	16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$
3.75±0.11±0.29	18k	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$

YOUR DATA

$3.67 \pm 0.10^{+0.27}_{-0.25}$		[2] ACHASOV	00	SND	$e^+e^- \to \pi^0\gamma$		ERROR=4
• • • We do not use the following data for averages, fits, limits, etc. • • •							
4.29 ± 0.11		[3] BENAYOUN	10	RVUE	0.4–1.05 e^+e^-		
YOUR NOTE	[1] From the VMD model with the interfering $\rho(770)$, $\omega(782)$, $\phi(1020)$ resonances, and an additional resonance describing the total contribution of the $\rho(1450)$ and $\omega(1420)$ states. Supersedes ACHASOV 00.						NODE=M004G3;LINKAGE=B
	[3] A simultaneous fit of $e^+e^- \to \pi^+\pi^-$, $\pi^+\pi^-\pi^0$, $\pi^0\gamma$, $\eta\gamma$ data.						NODE=M004G7;LINKAGE=BE
	[2] From the $\pi^0 \to 2\gamma$ decay and using $B(\pi^0 \to 2\gamma) = (98.798 \pm 0.032) \times 10^{-2}$.						NODE=M004G3;LINKAGE=A

$\phi(1020)$ BRANCHING RATIOS

NODE=M004220

$\Gamma(\pi^0\gamma)/\Gamma_{total}$ Γ_7/Γ

NODE=M004R17

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*	
1.31 ±0.13 OUR AVERAGE						NODE=M004R17
1.30 ±0.13		DRUZHININ	84	ND	$e^+e^- \to 3\gamma$	
1.4 ±0.5	32	COSME	76	OSPK	e^+e^-	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
YOUR DATA 1.367 ±0.072		[1] ACHASOV	16A	SND	0.60–1.38 $e^+e^- \to \pi^0\gamma$	OCCUR=3
1.258 ±0.037 ±0.077	18k	[2,3] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$	ERROR=5
$1.226 \pm 0.036^{+0.096}_{-0.089}$		[4] ACHASOV	00	SND	$e^+e^- \to \pi^0\gamma$	
1.26 ±0.17		[5] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$	
YOUR NOTE	[1] Using $B(\phi \to e^+e^-)$ from PDG 15. Supersedes ACHASOV 00.					NODE=M004R17;LINKAGE=D
	[5] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution.					NODE=M004R;LINKAGE=TS
	[2] Using $B(\phi \to e^+e^-) = (2.98 \pm 0.04) \times 10^{-4}$.					NODE=M004R17;LINKAGE=AH
	[3] Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{total}$.					NODE=M004R17;LINKAGE=AK
	[4] From the $\pi^0 \to 2\gamma$ decay and using $B(\phi \to e^+e^-) = (2.99 \pm 0.08) \times 10^{-4}$.					NODE=M004R;LINKAGE=3G

$\phi(1020)$ REFERENCES

NODE=M004

YOUR PAPER ACHASOV	16A	PR D93 092001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57513
PDG	15	RPP 2015 at pdg.lbl.gov		(PDG Collab.)	REFID=56977;ERROR=6
BENAYOUN	10	EPJ C65 211	M. Benayoun *et al.*		REFID=53212
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561
COSME	76	PL 63B 352	G. Cosme *et al.*	(ORSAY)	REFID=20529

Reference = ACHASOV 16B; PR D94 092002
Verifier code = DRUZHININ

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.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vladimir P. Druzhinin

EMAIL: v.p.druzhinin@inp.nsk.su

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

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=M125

$\omega(1420)$

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

$\omega(1420)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(\text{total})$

NODE=M125230

$\Gamma(\omega\eta)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_3/\Gamma \times \Gamma_5/\Gamma$

NODE=M125G6
NODE=M125G6

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA $1.6^{+0.9}_{-0.7}$	898	[24] ACHASOV	16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$

YOUR NOTE [24] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. The mass and the width of $\omega(1420)$ are fixed to the 2014 edition (PDG 14) of this review.

NODE=M125G6;LINKAGE=A

$\omega(1420)$ REFERENCES

NODE=M125

YOUR PAPER ACHASOV	16B	PR D94 092002	M.N. Achasov *et al.*	(SND Collab.)	REFID=57537
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)	REFID=55687

NODE=M126

$\omega(1650)$

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

$\omega(1650)$ MASS

NODE=M126M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1670± 30 OUR ESTIMATE					→ UNCHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 1660± 10	898	[1] ACHASOV	16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$
1680± 10	13.1k	[2] AULCHENKO	15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$
1667± 13± 6		AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
1645± 8	13	AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$
1660± 10± 2		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
1770± 50±60	1.2M	[3] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
1619± 5		[4] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi$, $\omega\pi\pi$
1700± 20		EUGENIO	01	SPEC	18 $\pi^- p \to \omega\eta n$
1705± 26	612	[5] AKHMETSHIN	00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$ OCCUR=2
1820^{+190}_{-150}		[6] ACHASOV	98H	RVUE	$e^+e^- \to \pi^+\pi^-\pi^0$
$1840^{+100}_{-\ 70}$		[7] ACHASOV	98H	RVUE	$e^+e^- \to \omega\pi^+\pi^-$ OCCUR=2
1780^{+170}_{-300}		[8] ACHASOV	98H	RVUE	$e^+e^- \to K^+K^-$ OCCUR=3
~ 2100		[9] ACHASOV	98H	RVUE	$e^+e^- \to K^0_S K^\pm\pi^\mp$ OCCUR=4
1606± 9		[10] CLEGG	94	RVUE	OCCUR=5
1662± 13	750	[11] ANTONELLI	92	DM2	1.34–2.4 $e^+e^- \to \rho\pi$, $\omega\pi\pi$ OCCUR=4
1670± 20		ATKINSON	83B	OMEG	20–70 $\gamma p \to 3\pi X$
1657± 13		CORDIER	81	DM1	$e^+e^- \to \omega 2\pi$
1679± 34	21	ESPOSITO	80	FRAM	$e^+e^- \to 3\pi$
1652± 17		COSME	79	OSPK	$e^+e^- \to 3\pi$

YOUR NOTE

[1] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. NODE=M126M;LINKAGE=E
[2] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. NODE=M126M;LINKAGE=A
[3] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126M;LINKAGE=VH
[4] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AB
[5] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M126M;LINKAGE=KI
[6] Using data from BARKOV 87, DOLINSKY 91, and ANTONELLI 92. NODE=M126M;LINKAGE=L1
[7] Using the data from ANTONELLI 92. NODE=M126M;LINKAGE=L2
[8] Using the data from IVANOV 81 and BISELLO 88B. NODE=M126M;LINKAGE=L3
[9] Using the data from BISELLO 91C. NODE=M126M;LINKAGE=L4
[10] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126M;LINKAGE=AD
[11] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126M;LINKAGE=AE

$\omega(1650)$ WIDTH

NODE=M126W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
315± 35 OUR ESTIMATE					→ UNCHECKED ←

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

YOUR DATA

110± 20	898	[12] ACHASOV	16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$
310± 30	13.1k	[13] AULCHENKO	15A	SND	1.05–1.80 $e^+e^- \to \pi^+\pi^-\pi^0$
222± 25± 20		AUBERT	07AU	BABR	10.6 $e^+e^- \to \omega\pi^+\pi^-\gamma$
114± 14	13	AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$
230± 30± 20		AUBERT,B	04N	BABR	10.6 $e^+e^- \to \pi^+\pi^-\pi^0\gamma$
$490^{+200}_{-150}\pm130$	1.2M	[14] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
250± 14		[15] HENNER	02	RVUE	1.2–2.0 $e^+e^- \to \rho\pi, \omega\pi\pi$
250± 50		EUGENIO	01	SPEC	18 $\pi^- p \to \omega\eta n$
370± 25	612	[16] AKHMETSHIN	00D	CMD2	$e^+e^- \to \omega\pi^+\pi^-$ OCCUR=2
113± 20		[17] CLEGG	94	RVUE	OCCUR=5
280± 24	750	[18] ANTONELLI	92	DM2	1.34–2.4 $e^+e^- \to \rho\pi, \omega\pi\pi$ OCCUR=4
160± 20		ATKINSON	83B	OMEG	20–70 $\gamma p \to 3\pi X$
136± 46		CORDIER	81	DM1	$e^+e^- \to \omega 2\pi$
99± 49	21	ESPOSITO	80	FRAM	$e^+e^- \to 3\pi$
42± 17		COSME	79	OSPK	$e^+e^- \to 3\pi$

YOUR NOTE

[12] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. NODE=M126W;LINKAGE=E
[13] From a fit with contributions from $\omega(782)$, $\phi(1020)$, $\omega(1420)$, and $\omega(1650)$. NODE=M126W;LINKAGE=A
[14] From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E. NODE=M126W;LINKAGE=VH
[15] Using results of CORDIER 81 and preliminary data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AB
[16] Using the data of AKHMETSHIN 00D and ANTONELLI 92. The $\rho\pi$ dominance for the energy dependence of the $\omega(1420)$ and $\omega(1650)$ width assumed. NODE=M126W;LINKAGE=KI
[17] From a fit to two Breit-Wigner functions and using the data of DOLINSKY 91 and ANTONELLI 92. NODE=M126W;LINKAGE=AD
[18] From the combined fit of the $\rho\pi$ and $\omega\pi\pi$ final states. NODE=M126W;LINKAGE=AE

$\omega(1650)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma^2(total)$

NODE=M126230

$\Gamma(\omega\eta)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_4/\Gamma$

NODE=M126G5
NODE=M126G5

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT

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

YOUR DATA

0.44±0.05		898	[19] ACHASOV	16B	SND	1.34–2.00 $e^+e^- \to \omega\eta$
0.57±0.06		13	AUBERT	06D	BABR	10.6 $e^+e^- \to \omega\eta\gamma$
<6	90		[28] AKHMETSHIN	03B	CMD2	$e^+e \to \eta\pi^0\gamma$ ERROR=7

YOUR NOTE

[19] From a fit with contributions from $\omega(1420)$, $\omega(1650)$, and $\phi(1680)$. NODE=M126G5;LINKAGE=A
[28] $\omega(1650)$ mass and width fixed at 1700 MeV and 250 MeV, respectively. NODE=M126G5;LINKAGE=KH

$\omega(1650)$ REFERENCES

NODE=M126

YOUR PAPER	ACHASOV	16B	PR D94 092002	M.N. Achasov *et al.*	(SND Collab.)	REFID=57537
	AULCHENKO	15A	JETP 121 27	V.M. Aulchenko *et al.*	(SND Collab.)	REFID=56843
			Translated from ZETF 148 34.			
	AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
	AUBERT	06D	PR D73 052003	B. Aubert *et al.*	(BABAR Collab.)	REFID=51047
	AUBERT,B	04N	PR D70 072004	B. Aubert *et al.*	(BABAR Collab.)	REFID=50184
	ACHASOV	03D	PR D68 052006	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49577
	AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49406
	ACHASOV	02E	PR D66 032001	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48815
	HENNER	02	EPJ C26 3	V.K. Henner *et al.*		REFID=49177
	ACHASOV	01E	PR D63 072002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48311
	EUGENIO	01	PL B497 190	P. Eugenio *et al.*		REFID=48010
	AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47935
	ACHASOV	99E	PL B462 365	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47391
	ACHASOV	98H	PR D57 4334	N.N. Achasov, A.A. Kozhevnikov		REFID=46323
	CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=44081
	ANTONELLI	92	ZPHY C56 15	A. Antonelli *et al.*	(DM2 Collab.)	REFID=43168
	BISELLO	91C	ZPHY C52 227	D. Bisello *et al.*	(DM2 Collab.)	REFID=41867
	DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
	BISELLO	88B	ZPHY C39 13	D. Bisello *et al.*	(PADO, CLER, FRAS+)	REFID=40581
	BARKOV	87	JETPL 46 164	L.M. Barkov *et al.*	(NOVO)	REFID=40280
			Translated from ZETFP 46 132.			
	ATKINSON	83B	PL 127B 132	M. Atkinson *et al.*	(BONN, CERN, GLAS+)	REFID=21502
	CORDIER	81	PL 106B 155	A. Cordier *et al.*	(ORSAY)	REFID=21586
	IVANOV	81	PL 107B 297	P.M. Ivanov *et al.*	(NOVO)	REFID=20553
	ESPOSITO	80	LNC 28 195	B. Esposito *et al.*	(FRAS, NAPL, PADO+)	REFID=21584
	COSME	79	NP B152 215	G. Cosme *et al.*	(IPN)	REFID=21475

Reference = ACHASOV 16D; PR D94 112001
Verifier code = DRUZHININ

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.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vladimir P. Druzhinin

EMAIL: v.p.druzhinin@inp.nsk.su

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

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=M105

$\rho(1450)$

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

See our mini-review under the $\rho(1700)$.

NODE=M105

$\rho(1450)$ MASS

NODE=M105205

$\omega\pi$ MODE

NODE=M105M3
NODE=M105M3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 1510 ± 7	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
$1544 \pm 22^{+11}_{-46}$	821	[2] MATVIENKO	15	BELL	$\overline{B}^0 \to D^{*+}\omega\pi^-$
1491 ± 19	7815	[3] ACHASOV	13	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
$1582 \pm 17 \pm 25$	2382	[4] AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
$1349 \pm 25^{+10}_{-5}$	341	[5] ALEXANDER	01B	CLE2	$B \to D^{(*)}\omega\pi^-$
1523 ± 10		[6] EDWARDS	00A	CLE2	$\tau^- \to \omega\pi^-\nu_\tau$
1463 ± 25		[7] CLEGG	94	RVUE	
1250		[8] ASTON	80C	OMEG	20–70 $\gamma p \to \omega\pi^0 p$
1290 ± 40		[8] BARBER	80C	SPEC	3–5 $\gamma p \to \omega\pi^0 p$

OCCUR=2

YOUR NOTE

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(770)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainties not estimated. Supersedes ACHASOV 13.
NODE=M105M3;LINKAGE=D

[2] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \to \pi\pi$ and $\rho(1450) \to \omega\pi$ decays.
NODE=M105M3;LINKAGE=C

[3] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated.
NODE=M105M3;LINKAGE=AC

[4] Using the data of AKHMETSHIN 03B and BISELLO 91B assuming the $\omega\pi^0$ and $\pi^+\pi^-$ mass dependence of the total width. $\rho(1700)$ mass and width fixed at 1700 MeV and 240 MeV, respectively.
NODE=M105M3;LINKAGE=HK

[5] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width.
NODE=M105M3;LINKAGE=3Z

[6] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.
NODE=M105M;LINKAGE=E1

[7] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.
NODE=M105M3;LINKAGE=B

[8] Not separated from $b_1(1235)$, not pure $J^P = 1^-$ effect.
NODE=M105M3;LINKAGE=A

$\rho(1450)$ WIDTH

NODE=M105210

$\omega\pi$ MODE

NODE=M105W3
NODE=M105W3

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 440 ± 40	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
303^{+31+69}_{-52-7}	821	[2] MATVIENKO	15	BELL	$\overline{B}^0 \to D^{*+}\omega\pi^-$
$429 \pm 42 \pm 10$	2382	[3] AKHMETSHIN	03B	CMD2	$e^+e \to \pi^0\pi^0\gamma$
$547 \pm 86^{+46}_{-45}$	341	[4] ALEXANDER	01B	CLE2	$B \to D^{(*)}\omega\pi^-$
400 ± 35		[5] EDWARDS	00A	CLE2	$\tau^- \to \omega\pi^-\nu_\tau$
311 ± 62		[6] CLEGG	94	RVUE	
300		[7] ASTON	80C	OMEG	20–70 $\gamma p \to \omega\pi^0 p$
320 ± 100		[7] BARBER	80C	SPEC	3–5 $\gamma p \to \omega\pi^0 p$

OCCUR=3

YOUR NOTE

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(770)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainties not estimated. Supersedes ACHASOV 13. NODE=M105W3;LINKAGE=D

[2] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \to \pi\pi$ and $\rho(1450) \to \omega\pi$ decays. NODE=M105W3;LINKAGE=C

[3] Using the data of AKHMETSHIN 03B and BISELLO 91B assuming the $\omega\pi^0$ and $\pi^+\pi^-$ mass dependence of the total width. $\rho(1700)$ mass and width fixed at 1700 MeV and 240 MeV, respectively. NODE=M105W3;LINKAGE=HK

[4] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width. NODE=M105W3;LINKAGE=3Z

[5] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M105W;LINKAGE=E1

[6] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L. NODE=M105W3;LINKAGE=B

[7] Not separated from $b_1(1235)$, not pure $J^P = 1^-$ effect. NODE=M105W3;LINKAGE=A

$\rho(1450)$ Γ(i)/Γ(total) × $\Gamma(e^+e^-)/\Gamma$(total)

NODE=M105230

$\Gamma(\omega\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3/\Gamma \times \Gamma_9/\Gamma$

NODE=M105R05
NODE=M105R05

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 2.1±0.4	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
5.3±0.4	7815	[2] ACHASOV	13	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=3

YOUR NOTE

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(770)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainties not estimated. Supersedes ACHASOV 13. NODE=M105R05;LINKAGE=A

[2] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated. NODE=M105R05;LINKAGE=AC

$\rho(1450)$ REFERENCES

NODE=M105

YOUR PAPER

ACHASOV	16D	PR D94 112001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57618
MATVIENKO	15	PR D92 012013	D. Matvienko *et al.*	(BELLE Collab.)	REFID=56601
ACHASOV	13	PR D88 054013	M.N. Achasov *et al.*	(SND Collab.)	REFID=55584
AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49406
ALEXANDER	01B	PR D64 092001	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=48391
EDWARDS	00A	PR D61 072003	K.W. Edwards *et al.*	(CLEO Collab.)	REFID=47465
CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)	REFID=44081
BISELLO	91B	NPBPS B21 111	D. Bisello	(DM2 Collab.)	REFID=41752
ALBRECHT	87L	PL B185 223	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40418
DOLINSKY	86	PL B174 453	S.I. Dolinsky *et al.*	(NOVO)	REFID=20246
ASTON	80C	PL 92B 211	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)	REFID=20652
BARBER	80C	ZPHY C4 169	D.P. Barber *et al.*	(DARE, LANC, SHEF)	REFID=20653

NODE=M065

$\rho(1700)$

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

$\rho(1700)$ Γ(i)/Γ(total) × $\Gamma(e^+e^-)/\Gamma$(total)

NODE=M065240

$\Gamma(\pi^0\omega)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_{18}/\Gamma \times \Gamma_{17}/\Gamma$

NODE=M065R01
NODE=M065R01

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 0.09±0.05	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$
1.7 ±0.4	7815	[2] ACHASOV	13	SND	1.05–2.00 $e^+e^- \to \pi^0\pi^0\gamma$

OCCUR=4

YOUR NOTE

[1] From a phenomenological model based on vector meson dominance with interfering $\rho(700)$, $\rho(1450)$, and $\rho(1700)$. The $\rho(1700)$ mass and width are fixed at 1720 MeV and 250 MeV, respectively. Systematic uncertainty not estimated. Supersedes ACHASOV 13. NODE=M065R01;LINKAGE=B

[2] From a phenomenological model based on vector meson dominance with the interfering $\rho(1450)$ and $\rho(1700)$ and their widths fixed at 400 and 250 MeV, respectively. Systematic uncertainty not estimated. NODE=M065R01;LINKAGE=AC

$\rho(1700)$ REFERENCES

NODE=M065

YOUR PAPER

ACHASOV	16D	PR D94 112001	M.N. Achasov *et al.*	(SND Collab.)	REFID=57618
ACHASOV	13	PR D88 054013	M.N. Achasov *et al.*	(SND Collab.)	REFID=55584