NODE=M009

$\rho(770)$

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

A REVIEW GOES HERE – Check our WWW List of Reviews

NODE=M009

$\rho(770)$ MASS

NODE=M009205

We no longer list S-wave Breit-Wigner fits, or data with high combinatorial background.

NODE=M009205

NEUTRAL ONLY, $e^+ e^-$

NODE=M009M0
NODE=M009M0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
775.49±0.34 OUR AVERAGE						
775.97±0.46±0.70	900k	[1] AKHMETSHIN	07		$e^+ e^- \rightarrow \pi^+ \pi^-$	
774.6 ±0.4 ±0.5	800k	[2,3] ACHASOV	06	SND	$e^+ e^- \rightarrow \pi^+ \pi^-$	
775.65±0.64±0.50	114k	[4,5] AKHMETSHIN	04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^-$	
775.9 ±0.5 ±0.5	1.98M	[6] ALOISIO	03	KLOE	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	
775.8 ±0.9 ±2.0	500k	[6] ACHASOV	02	SND	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	
775.9 ±1.1		[7] BARKOV	85	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
775.8 ±0.5 ±0.3	1.98M	[8] ALOISIO	03	KLOE	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=2
775.9 ±0.6 ±0.5	1.98M	[9] ALOISIO	03	KLOE	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=3
775.0 ±0.6 ±1.1	500k	[10] ACHASOV	02	SND	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=3
775.1 ±0.7 ±5.3		[11] BENAYOUN	98	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$, $\mu^+ \mu^-$	
770.5 ±1.9 ±5.1		[12] GARDNER	98	RVUE	0.28–0.92 $e^+ e^- \rightarrow \pi^+ \pi^-$	
764.1 ±0.7		[13] O'CONNELL	97	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$	
757.5 ±1.5		[14] BERNICHA	94	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$	
768 ±1		[15] GESHKEN...	89	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$	

CHARGED ONLY, τ DECAYS and $e^+ e^-$

NODE=M009M5
NODE=M009M5

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
775.11±0.34 OUR AVERAGE							
774.6 ±0.2 ±0.5	5.4M	[16,17] FUJIKAWA	08	BELL	±	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
775.5 ±0.7		[17,18] SCHAEL	05C	ALEP		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
775.5 ±0.5 ±0.4	1.98M	[6] ALOISIO	03	KLOE		1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	
775.1 ±1.1 ±0.5	87k	[19,20] ANDERSON	00A	CLE2		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
774.8 ±0.6 ±0.4	1.98M	[9] ALOISIO	03	KLOE	−	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=2
776.3 ±0.6 ±0.7	1.98M	[9] ALOISIO	03	KLOE	+	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=3
773.9 ±2.0 $^{+0.3}_{-1.0}$		[21] SANZ-CILLERO	03	RVUE		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	
774.5 ±0.7 ±1.5	500k	[6] ACHASOV	02	SND	±	1.02 $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$	OCCUR=2
775.1 ±0.5		[22] PICH	01	RVUE		$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$	

MIXED CHARGES, OTHER REACTIONS

NODE=M009M7
NODE=M009M7

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
763.0±0.3±1.2	600k	[23] ABELE	99E	CBAR	0±	0.0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0$

NODE=M009M3

CHARGED ONLY, HADROPRODUCED

NODE=M009M2
NODE=M009M2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
766.5±1.1 OUR AVERAGE							
763.7±3.2		ABELE	97	CBAR		$\overline{p} n \rightarrow \pi^- \pi^0 \pi^0$	
768 ±9		AGUILAR-...	91	EHS		400 $p p$	
767 ±3	2935	[24] CAPRARO	87	SPEC	−	200 π^- Cu $\rightarrow \pi^- \pi^0$ Cu	
761 ±5	967	[24] CAPRARO	87	SPEC	−	200 π^- Pb $\rightarrow \pi^- \pi^0$ Pb	OCCUR=2
771 ±4		HUSTON	86	SPEC	+	202 π^+ A $\rightarrow \pi^+ \pi^0$ A	
766 ±7	6500	[25] BYERLY	73	OSPK	−	5 $\pi^- p$	
766.8±1.5	9650	[26] PISUT	68	RVUE	−	1.7–3.2 $\pi^- p$, t <10	
767 ±6	900	[24] EISNER	67	HBC	−	4.2 $\pi^- p$, t <10	

NEUTRAL ONLY, PHOTOPRODUCED

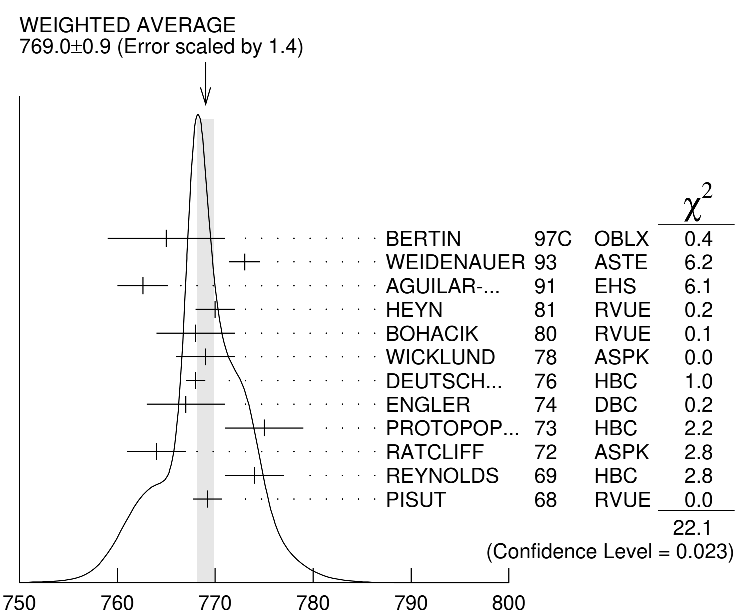
NODE=M009M0P
NODE=M009M0P

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
768.5± 1.1 OUR AVERAGE							
770 ± 2 ±1	79k	[27] BREITWEG	98B	ZEUS	0	50–100 γp	
767.6± 2.7		BARTALUCCI	78	CNTR	0	$\gamma p \rightarrow e^+ e^- p$	
775 ± 5		GLADDING	73	CNTR	0	2.9–4.7 γp	
767 ± 4	1930	BALLAM	72	HBC	0	2.8 γp	
770 ± 4	2430	BALLAM	72	HBC	0	4.7 γp	OCCUR=2
765 ±10		ALVENSLEB...	70	CNTR	0	γA, $t <$0.01	
767.7± 1.9	140k	BIGGS	70	CNTR	0	$<$4.1 γC $\rightarrow \pi^+ \pi^-$ C	
765 ± 5	4000	ASBURY	67B	CNTR	0	$\gamma +$ Pb	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
771 ± 2	79k	[28] BREITWEG	98B	ZEUS	0	50–100 γp	OCCUR=2

NEUTRAL ONLY, OTHER REACTIONS

NODE=M009M0R
NODE=M009M0R

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
769.0±0.9 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.							
765 ±6		BERTIN	97C	OBLX		0.0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0$	
773 ±1.6		WEIDENAUER	93	ASTE		$\overline{p} p \rightarrow \pi^+ \pi^- \omega$	
762.6±2.6		AGUILAR-...	91	EHS		400 $p p$	
770 ±2		[29] HEYN	81	RVUE		Pion form factor	
768 ±4		[30,31] BOHACIK	80	RVUE	0		
769 ±3		[25] WICKLUND	78	ASPK	0	3,4,6 $\pi^\pm N$	
768 ±1	76000	DEUTSCH...	76	HBC	0	16 $\pi^+ p$	
767 ±4	4100	ENGLER	74	DBC	0	6 $\pi^+ n \rightarrow \pi^+ \pi^- p$	
775 ±4	32000	[30] PROTOPOP...	73	HBC	0	7.1 $\pi^+ p$, $t <$0.4	
764 ±3	6800	RATCLIFF	72	ASPK	0	15 $\pi^- p$, $t <$0.3	
774 ±3	1700	REYNOLDS	69	HBC	0	2.26 $\pi^- p$	
769.2±1.5	13300	[32] PISUT	68	RVUE	0	1.7–3.2 $\pi^- p$, $t <$10	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
773.5±2.5		[33] COLANGELO	01	RVUE		$\pi\pi \rightarrow \pi\pi$	
762.3±0.5±1.2	600k	[34] ABELE	99E	CBAR	0	0.0 $\overline{p} p \rightarrow \pi^+ \pi^- \pi^0$	
777 ±2	4943	[35] ADAMS	97	E665		470 $\mu p \rightarrow \mu X B$	
770 ±2		[36] BOGOLYUB...	97	MIRA		32 $\overline{p} p \rightarrow \pi^+ \pi^-$ X	
768 ±8		[36] BOGOLYUB...	97	MIRA		32 $p p \rightarrow \pi^+ \pi^-$ X	OCCUR=2
761.1±2.9		DUBNICKA	89	RVUE		π form factor	
777.4±2.0		[37] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized	
769.5±0.7		[30,31] LANG	79	RVUE	0		
770 ±9		[31] ESTABROOKS	74	RVUE	0	17 $\pi^- p \rightarrow \pi^+ \pi^- n$	
773.5±1.7	11200	[24] JACOBS	72	HBC	0	2.8 $\pi^- p$	
775 ±3	2250	HYAMS	68	OSPK	0	11.2 $\pi^- p$	



$\rho(770)^0$ mass (MeV)

[1] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05.
[2] Supersedes ACHASOV 05A.
[3] A fit of the SND data from 400 to 1000 MeV using parameters of the $\rho(1450)$ and $\rho(1700)$ from a fit of the data of BARKOV 85, BISELLO 89 and ANDERSON 00A.
[4] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference.
[5] Update of AKHMETSHIN 02.
[6] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$.
[7] From the GOUNARIS 68 parametrization of the pion form factor.
[8] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$.
[9] Without limitations on masses and widths.
[10] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$.
[11] Using the data of BARKOV 85 in the hidden local symmetry model.
[12] From the fit to $e^+e^- \rightarrow \pi^+\pi^-$ data from the compilations of HEYN 81 and BARKOV 85, including the GOUNARIS 68 parametrization of the pion form factor.
[13] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling.
[14] Applying the S-matrix formalism to the BARKOV 85 data.
[15] Includes BARKOV 85 data. Model-dependent width definition.
[16] $|F_\pi(0)|^2$ fixed to 1.
[17] From the GOUNARIS 68 parametrization of the pion form factor.
[18] The error combines statistical and systematic uncertainties. Supersedes BARATE 97M.
[19] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.
[20] From the GOUNARIS 68 parametrization of the pion form factor. The second error is a model error taking into account different parametrizations of the pion form factor.
[21] Using the data of BARATE 97M and the effective chiral Lagrangian.
[22] From a fit of the model-independent parameterization of the pion form factor to the data of BARATE 97M.
[23] Assuming the equality of ρ^+ and ρ^- masses and widths.
[24] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[25] Phase shift analysis. Systematic errors added corresponding to spread of different fits.
[26] From fit of 3-parameter relativistic P-wave Breit-Wigner to total mass distribution. Includes BATON 68, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65 and CARMONY 64.
[27] From the parametrization according to SOEDING 66.
[28] From the parametrization according to ROSS 66.
[29] HEYN 81 includes all spacelike and timelike F_π values until 1978.
[30] From pole extrapolation.
[31] From phase shift analysis of GRAYER 74 data.
[32] Includes MALAMUD 69, ARMENISE 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, GOLDHABER 64, ABOLINS 63.
[33] Breit-Wigner mass from a phase-shift analysis of HYAMS 73 and PROTOPOPESCU 73 data.
[34] Using relativistic Breit-Wigner and taking into account ρ-ω interference.
[35] Systematic errors not evaluated.
[36] Systematic effects not studied.
[37] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74.

NODE=M009M0;LINKAGE=AK
NODE=M009M0;LINKAGE=AC
NODE=M009M0;LINKAGE=SN
NODE=M009M5;LINKAGE=GS
NODE=M009M5;LINKAGE=PT
NODE=M009M0;LINKAGE=CH
NODE=M009M;LINKAGE=K
NODE=M009M;LINKAGE=DF
NODE=M009M;LINKAGE=WO
NODE=M009M;LINKAGE=HC
NODE=M009M;LINKAGE=K2
NODE=M009M;LINKAGE=G8
NODE=M009M;LINKAGE=AB
NODE=M009M;LINKAGE=AA
NODE=M009M;LINKAGE=F
NODE=M009M5;LINKAGE=FU
NODE=M009M5;LINKAGE=GO
NODE=M009M5;LINKAGE=SC
NODE=M009M;LINKAGE=A6
NODE=M009M;LINKAGE=K1
NODE=M009M5;LINKAGE=Z
NODE=M009M;LINKAGE=PC
NODE=M009M;LINKAGE=LB
NODE=M009M;LINKAGE=Z
NODE=M009M;LINKAGE=X
NODE=M009M;LINKAGE=A
NODE=M009M;LINKAGE=B5
NODE=M009M;LINKAGE=B6
NODE=M009M;LINKAGE=B
NODE=M009M;LINKAGE=C
NODE=M009M;LINKAGE=H
NODE=M009M;LINKAGE=R
NODE=M009M;LINKAGE=CL
NODE=M009M;LINKAGE=BL
NODE=M009M;LINKAGE=A1
NODE=M009M;LINKAGE=QQ
NODE=M009M;LINKAGE=G

$m_{\rho(770)^0} - m_{\rho(770)^\pm}$

NODE=M009210

NODE=M009D

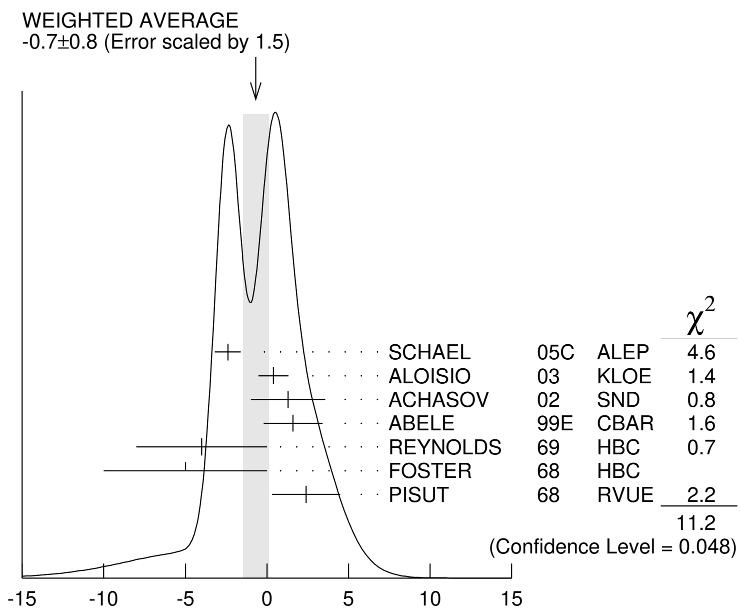
VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
−0.7±0.8 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.					
−2.4±0.8		[38] SCHAEL	05C	ALEP		$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
0.4±0.7±0.6	1.98M	[39] ALOISIO	03	KLOE		1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
1.3±1.1±2.0	500k	[39] ACHASOV	02	SND		1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
1.6±0.6±1.7	600k	ABELE	99E	CBAR	0±	0.0 $\overline{p}p \rightarrow \pi^+\pi^-\pi^0$
−4 ±4	3000	[40] REYNOLDS	69	HBC	−0	2.26 π^-p
−5 ±5	3600	[40] FOSTER	68	HBC	±0	0.0 $\overline{p}p$
2.4±2.1	22950	[41] PISUT	68	RVUE		$\pi N \rightarrow \rho N$

[38] From the combined fit of the τ^- data from ANDERSON 00A and SCHAEL 05C and $e^+ e^-$ data from the compilation of BARKOV 85, AKHMETSHIN 04, and ALOISIO 05. Supersedes BARATE 97M. NODE=M009D;LINKAGE=SC

[39] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009D;LINKAGE=CH

[40] From quoted masses of charged and neutral modes. NODE=M009D;LINKAGE=A

[41] Includes MALAMUD 69, ARMENISE 68, BATON 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65, CARMONY 64, GOLDHABER 64, ABOLINS 63. NODE=M009D;LINKAGE=R



$m_{\rho(770)^0} - m_{\rho(770)^\pm}$ (MeV)

$m_{\rho(770)^+} - m_{\rho(770)^-}$

NODE=M009212

NODE=M009D1

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.5\pm0.8\pm0.7$	1.98M	[42] ALOISIO	03	KLOE	$1.02\ e^+ e^- \to \pi^+ \pi^- \pi^0$

[42] Without limitations on masses and widths. NODE=M009D;LINKAGE=WO

$\rho(770)$ RANGE PARAMETER

NODE=M009215

The range parameter R enters an energy-dependent correction to the width, of the form $(1 + q_r^2\ R^2)\ /\ (1 + q^2\ R^2)$, where q is the momentum of one of the pions in the $\pi\pi$ rest system. At resonance, $q = q_r$.

NODE=M009215

NODE=M009R

VALUE (GeV^{-1})	DOCUMENT ID		TECN	CHG	COMMENT
$5.3^{+0.9}_{-0.7}$	CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized

$\rho(770)$ WIDTH

NODE=M009220

We no longer list S-wave Breit-Wigner fits, or data with high combinatorial background.

NODE=M009220

NEUTRAL ONLY, $e^+ e^-$

NODE=M009W0
NODE=M009W0

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
146.2 ±0.7 OUR AVERAGE	Error includes scale factor of 1.1.					
$145.98\pm0.75\pm0.50$	900k	[43] AKHMETSHIN	07			$e^+ e^- \to \pi^+ \pi^-$
$146.1\ \pm0.8\ \pm1.5$	800k	[44,45] ACHASOV	06	SND		$e^+ e^- \to \pi^+ \pi^-$
$143.85\pm1.33\pm0.80$	114k	[46,47] AKHMETSHIN	04	CMD2		$e^+ e^- \to \pi^+ \pi^-$
$147.3\ \pm1.5\ \pm0.7$	1.98M	[48] ALOISIO	03	KLOE		$1.02\ e^+ e^- \to \pi^+ \pi^- \pi^0$
$151.1\ \pm2.6\ \pm3.0$	500k	[48] ACHASOV	02	SND	0	$1.02\ e^+ e^- \to \pi^+ \pi^- \pi^0$
$150.5\ \pm3.0$		[49] BARKOV	85	OLYA	0	$e^+ e^- \to \pi^+ \pi^-$

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

143.9 ±1.3 ±1.1	1.98M	[50] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
147.4 ±1.5 ±0.7	1.98M	[51] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
149.8 ±2.2 ±2.0	500k	[52] ACHASOV	02	SND	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
147.9 ±1.5 ±7.5		[53] BENAYOUN	98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$	
153.5 ±1.3 ±4.6		[54] GARDNER	98	RVUE	0.28–0.92 $e^+e^- \to \pi^+\pi^-$	
145.0 ±1.7		[55] O'CONNELL	97	RVUE	$e^+e^- \to \pi^+\pi^-$	
142.5 ±3.5		[56] BERNICHA	94	RVUE	$e^+e^- \to \pi^+\pi^-$	
138 ±1		[57] GESHKEN...	89	RVUE	$e^+e^- \to \pi^+\pi^-$	

CHARGED ONLY, τ DECAYS and e^+e^-

NODE=M009W5
NODE=M009W5

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
149.1±0.8 OUR FIT							
149.1±0.8 OUR AVERAGE							
148.1±0.4±1.7	5.4M	[58,59] FUJIKAWA	08	BELL	$\pm$	$\tau^- \to \pi^-\pi^0\nu_\tau$	
149.0±1.2		[59,60] SCHAEL	05C	ALEP		$\tau^- \to \pi^-\pi^0\nu_\tau$	
149.9±2.3±2.0	500k	[48] ACHASOV	02	SND	$\pm$	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
150.4±1.4±1.4	87k	[61,62] ANDERSON	00A	CLE2		$\tau^- \to \pi^-\pi^0\nu_\tau$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
143.7±1.3±1.2	1.98M	[48] ALOISIO	03	KLOE	$\pm$	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	
142.9±1.3±1.4	1.98M	[51] ALOISIO	03	KLOE	$-$	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=2
144.7±1.4±1.2	1.98M	[51] ALOISIO	03	KLOE	$+$	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=3
150.2±2.0$^{+0.7}_{-1.6}$		[63] SANZ-CILLERO	03	RVUE		$\tau^- \to \pi^-\pi^0\nu_\tau$	
150.9±2.2±2.0	500k	[52] ACHASOV	02	SND		1.02 $e^+e^- \to \pi^+\pi^-\pi^0$	OCCUR=4

MIXED CHARGES, OTHER REACTIONS

NODE=M009W7
NODE=M009W7

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
149.5±1.3	600k	[64] ABELE	99E	CBAR	0±	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$

CHARGED ONLY, HADROPRODUCED

NODE=M009W2
NODE=M009W2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
150.2± 2.4 OUR FIT							
150.2± 2.4 OUR AVERAGE							
152.8± 4.3		ABELE	97	CBAR		$\overline{p}n \to \pi^-\pi^0\pi^0$	
155 ±11	2935	[65] CAPRARO	87	SPEC	$-$	200 π^-Cu $\to \pi^-\pi^0$Cu	
154 ±20	967	[65] CAPRARO	87	SPEC	$-$	200 π^-Pb $\to \pi^-\pi^0$Pb	OCCUR=2
150 ± 5		HUSTON	86	SPEC	$+$	202 π^+A $\to \pi^+\pi^0$A	
146 ±12	6500	[66] BYERLY	73	OSPK	$-$	5 π^-p	
148.2± 4.1	9650	[67] PISUT	68	RVUE	$-$	1.7–3.2 π^-p, $t<10$	
146 ±13	900	EISNER	67	HBC	$-$	4.2 π^-p, $t<10$	

NEUTRAL ONLY, PHOTOPRODUCED

NODE=M009W0P
NODE=M009W0P

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
150.7± 2.9 OUR AVERAGE							
146 ± 3 ±13	79k	[68] BREITWEG	98B	ZEUS	0	50–100 γp	
150.9± 3.0		BARTALUCCI	78	CNTR	0	$\gamma p \to e^+e^-p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
138 ± 3	79k	[69] BREITWEG	98B	ZEUS	0	50–100 γp	OCCUR=2
147 ±11		GLADDING	73	CNTR	0	2.9–4.7 γp	
155 ±12	2430	BALLAM	72	HBC	0	4.7 γp	
145 ±13	1930	BALLAM	72	HBC	0	2.8 γp	OCCUR=2
140 ± 5		ALVENSLEB...	70	CNTR	0	γA, $t<0.01$	
146.1± 2.9	140k	BIGGS	70	CNTR	0	$<$4.1 γC $\to \pi^+\pi^-$C	
160 ±10		LANZEROTTI	68	CNTR	0	γp	
130 ± 5	4000	ASBURY	67B	CNTR	0	$\gamma +$ Pb	

NEUTRAL ONLY, OTHER REACTIONS

NODE=M009W0R

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
150.9± 1.7 OUR AVERAGE		Error includes scale factor of 1.1.				
122 ±20		BERTIN	97C	OBLX		0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
145.7± 5.3		WEIDENAUER	93	ASTE		$\overline{p}p \to \pi^+\pi^-\omega$
144.9± 3.7		DUBNICKA	89	RVUE		π form factor
148 ± 6		[70,71] BOHACIK	80	RVUE	0	
152 ± 9		[66] WICKLUND	78	ASPK	0	3,4,6 $\pi^\pm p N$
154 ± 2	76000	DEUTSCH...	76	HBC	0	16 $\pi^+ p$
157 ± 8	6800	RATCLIFF	72	ASPK	0	15 $\pi^- p$, t <0.3
143 ± 8	1700	REYNOLDS	69	HBC	0	2.26 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
147.0± 2.5	600k	[72] ABELE	99E	CBAR	0	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
146 ± 3	4943	[73] ADAMS	97	E665		470 $\mu p \to \mu X B$
$160.0^{+4.1}_{-4.0}$		[74] CHABAUD	83	ASPK	0	17 $\pi^- p$ polarized
155 ± 1		[75] HEYN	81	RVUE	0	π form factor
148.0± 1.3		[70,71] LANG	79	RVUE	0	
146 ±14	4100	ENGLER	74	DBC	0	6 $\pi^+ n \to \pi^+\pi^- p$
143 ±13		[71] ESTABROOKS	74	RVUE	0	17 $\pi^- p \to \pi^+\pi^- n$
160 ±10	32000	[70] PROTOPOP...	73	HBC	0	7.1 $\pi^+ p$, t <0.4
145 ±12	2250	[65] HYAMS	68	OSPK	0	11.2 $\pi^- p$
163 ±15	13300	[76] PISUT	68	RVUE	0	1.7–3.2 $\pi^- p$, t <10

[43] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M009W;LINKAGE=AK
[44] Supersedes ACHASOV 05A. NODE=M009W0;LINKAGE=AC
[45] A fit of the SND data from 400 to 1000 MeV using parameters of the $\rho(1450)$ and $\rho(1700)$ from a fit of the data of BARKOV 85, BISELLO 89 and ANDERSON 00A. NODE=M009W0;LINKAGE=SN
[46] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009W5;LINKAGE=GS
[47] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02. NODE=M009W5;LINKAGE=P2
[48] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$. NODE=M009W;LINKAGE=CH
[49] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W;LINKAGE=K
[50] Assuming $m_{\rho^+} = m_{\rho^-} = m_{\rho^0}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-} = \Gamma_{\rho^0}$. NODE=M009W;LINKAGE=DF
[51] Without limitations on masses and widths. NODE=M009W;LINKAGE=WO
[52] Assuming $m_{\rho^0} = m_{\rho^\pm}$, $g_{\rho^0\pi\pi} = g_{\rho^\pm\pi\pi}$. NODE=M009W;LINKAGE=HC
[53] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009W;LINKAGE=K2
[54] From the fit to $e^+e^- \to \pi^+\pi^-$ data from the compilations of HEYN 81 and BARKOV 85, including the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W;LINKAGE=G8
[55] A fit of BARKOV 85 data assuming the direct $\omega\pi\pi$ coupling. NODE=M009W;LINKAGE=AB
[56] Applying the S-matrix formalism to the BARKOV 85 data. NODE=M009W;LINKAGE=AA
[57] Includes BARKOV 85 data. Model-dependent width definition. NODE=M009W;LINKAGE=F
[58] $|F_\pi(0)|^2$ fixed to 1. NODE=M009W5;LINKAGE=FU
[59] From the GOUNARIS 68 parametrization of the pion form factor. NODE=M009W5;LINKAGE=GO
[60] The error combines statistical and systematic uncertainties. Supersedes BARATE 97M. NODE=M009W5;LINKAGE=SC
[61] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively. NODE=M009W;LINKAGE=A6
[62] From the GOUNARIS 68 parametrization of the pion form factor. The second error is a model error taking into account different parametrizations of the pion form factor. NODE=M009W;LINKAGE=K1
[63] Using the data of BARATE 97M and the effective chiral Lagrangian. NODE=M009W5;LINKAGE=Z
[64] Assuming the equality of ρ^+ and ρ^- masses and widths. NODE=M009W;LINKAGE=LB
[65] Width errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass. NODE=M009W;LINKAGE=Z
[66] Phase shift analysis. Systematic errors added corresponding to spread of different fits. NODE=M009W;LINKAGE=X
[67] From fit of 3-parameter relativistic P-wave Breit-Wigner to total mass distribution. Includes BATON 68, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65 and CARMONY 64. NODE=M009W;LINKAGE=A
[68] From the parametrization according to SOEDING 66. NODE=M009W;LINKAGE=B5
[69] From the parametrization according to ROSS 66. NODE=M009W;LINKAGE=B6
[70] From pole extrapolation. NODE=M009W;LINKAGE=C
[71] From phase shift analysis of GRAYER 74 data. NODE=M009W;LINKAGE=H
[72] Using relativistic Breit-Wigner and taking into account ρ-ω interference. NODE=M009W;LINKAGE=BL
[73] Systematic errors not evaluated. NODE=M009W;LINKAGE=A1
[74] From fit of 3-parameter relativistic Breit-Wigner to helicity-zero part of P-wave intensity. CHABAUD 83 includes data of GRAYER 74. NODE=M009W;LINKAGE=G
[75] HEYN 81 includes all spacelike and timelike F_π values until 1978. NODE=M009W;LINKAGE=B
[76] Includes MALAMUD 69, ARMENISE 68, BACON 67, HUWE 67, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, GOLDHABER 64, ABOLINS 63. NODE=M009W;LINKAGE=R

$\Gamma_{\rho(770)^0} - \Gamma_{\rho(770)^\pm}$

NODE=M009W6

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.3±1.3 OUR AVERAGE		Error includes scale factor of 1.4.			
−0.2±1.0		[77] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
3.6±1.8±1.7	1.98M	[78] ALOISIO	03	KLOE	1.02 $e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma_{\rho(770)^+} - \Gamma_{\rho(770)^-}$

NODE=M009W16

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±2.0±0.5	1.98M	[79] ALOISIO	03	KLOE	1.02 $e^+e^- \rightarrow \pi^+\pi^-\pi^0$

[77] From the combined fit of the τ^- data from ANDERSON 00A and SCHAEL 05C and e^+e^- data from the compilation of BARKOV 85, AKHMETSHIN 04, and ALOISIO 05. Supersedes BARATE 97M.

NODE=M009W6;LINKAGE=SC

[78] Assuming $m_{\rho^+} = m_{\rho^-}$, $\Gamma_{\rho^+} = \Gamma_{\rho^-}$.

NODE=M009W6;LINKAGE=CH

[79] Without limitations on masses and widths.

NODE=M009W16;LINKAGE=WO

$\rho(770)$ DECAY MODES

NODE=M009225;NODE=M009

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	
Γ_1	$\pi\pi$	$\sim$ 100 %		DESIG=1;OUR EVAL;→ NOT CHECKED ←
	$\rho(770)^\pm$ decays			NODE=M009;CLUMP=A
Γ_2	$\pi^\pm\pi^0$	$\sim$ 100 %		DESIG=11;OUR EVAL; → NOT CHECKED ←
Γ_3	$\pi^\pm\gamma$	(4.5 ±0.5) $\times 10^{-4}$	S=2.2	DESIG=3
Γ_4	$\pi^\pm\eta$	< 6 $\times 10^{-3}$	CL=84%	DESIG=5
Γ_5	$\pi^\pm\pi^+\pi^-\pi^0$	< 2.0 $\times 10^{-3}$	CL=84%	DESIG=21
	$\rho(770)^0$ decays			NODE=M009;CLUMP=B
Γ_6	$\pi^+\pi^-$	$\sim$ 100 %		DESIG=12;OUR EVAL; → NOT CHECKED ←
Γ_7	$\pi^+\pi^-\gamma$	(9.9 ±1.6) $\times 10^{-3}$		DESIG=60
Γ_8	$\pi^0\gamma$	(6.0 ±0.8) $\times 10^{-4}$		DESIG=40
Γ_9	$\eta\gamma$	(3.00±0.20) $\times 10^{-4}$		DESIG=8
Γ_{10}	$\pi^0\pi^0\gamma$	(4.5 ±0.8) $\times 10^{-5}$		DESIG=80
Γ_{11}	$\mu^+\mu^-$	[a] (4.55±0.28) $\times 10^{-5}$		DESIG=6
Γ_{12}	e^+e^-	[a] (4.72±0.05) $\times 10^{-5}$		DESIG=4
Γ_{13}	$\pi^+\pi^-\pi^0$	($1.01^{+0.54}_{-0.36}$ ±0.34) $\times 10^{-4}$		DESIG=7;OUR EVAL;→ NOT CHECKED ←
Γ_{14}	$\pi^+\pi^-\pi^+\pi^-$	(1.8 ±0.9) $\times 10^{-5}$		DESIG=22
Γ_{15}	$\pi^+\pi^-\pi^0\pi^0$	< 4 $\times 10^{-5}$	CL=90%	DESIG=30
Γ_{16}	$\pi^0e^+e^-$	< 1.2 $\times 10^{-5}$	CL=90%	DESIG=9
Γ_{17}	ηe^+e^-			DESIG=10

[a] The $\omega\rho$ interference is then due to $\omega\rho$ mixing only, and is expected to be small. If $e\mu$ universality holds, $\Gamma(\rho^0 \rightarrow \mu^+\mu^-) = \Gamma(\rho^0 \rightarrow e^+e^-) \times 0.99785$.

LINKAGE=MD2

CONSTRAINED FIT INFORMATION

An overall fit to the total width and a partial width uses 10 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 10.7$ for 8 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle\delta p_i \delta p_j\rangle/(\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_3	−100	
Γ	15	−15
	x_2	x_3

	Mode	Rate (MeV)	Scale factor	
Γ_2	$\pi^\pm\pi^0$	150.2 ±2.4		DESIG=11
Γ_3	$\pi^\pm\gamma$	0.068±0.007	2.3	DESIG=3

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 7 branching ratios uses 21 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 6.0$ for 13 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta p_i \delta p_j \right\rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_7	−100							
x_8	−5	0						
x_9	−1	0	1					
x_{10}	−1	0	0	0				
x_{11}	2	−3	0	0	0			
x_{12}	0	0	−8	−9	0	0		
x_{14}	−1	0	0	0	0	0	0	
Γ	0	0	4	5	0	0	−54	0
	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{14}

	Mode		Rate (MeV)		
Γ_6	$\pi^+\pi^-$		147.5	±0.9	DESIG=12
Γ_7	$\pi^+\pi^-\gamma$		1.48	±0.24	DESIG=60
Γ_8	$\pi^0\gamma$		0.089	±0.012	DESIG=40
Γ_9	$\eta\gamma$		0.0447	±0.0031	DESIG=8
Γ_{10}	$\pi^0\pi^0\gamma$		0.0066	±0.0012	DESIG=80
Γ_{11}	$\mu^+\mu^-$	[a]	0.0068	±0.0004	DESIG=6
Γ_{12}	e^+e^-	[a]	0.00704	±0.00006	DESIG=4
Γ_{14}	$\pi^+\pi^-\pi^+\pi^-$		0.0027	±0.0014	DESIG=22

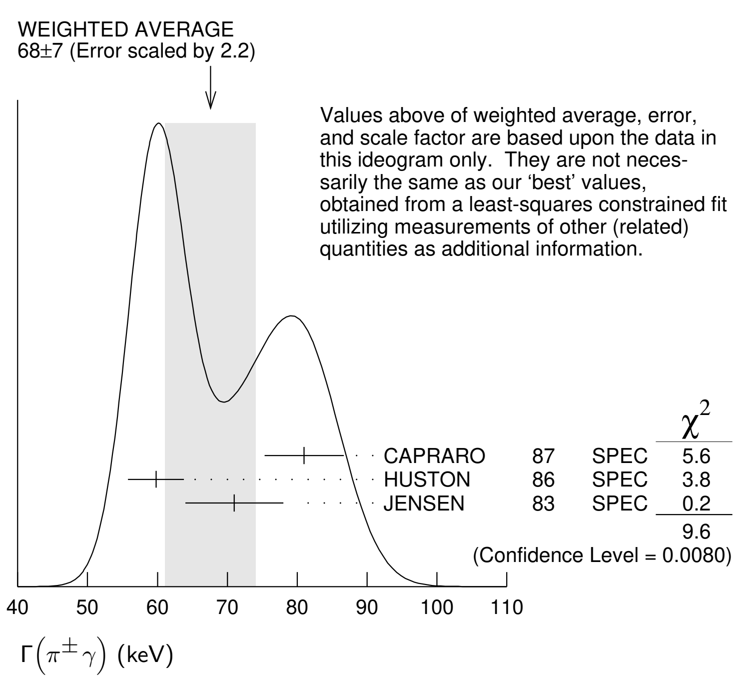
$\rho(770)$ PARTIAL WIDTHS

NODE=M009230

$\Gamma(\pi^\pm\gamma)$ Γ_3

NODE=M009W3
NODE=M009W3

VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
68 ±7 OUR FIT Error includes scale factor of 2.3.					
68 ±7 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.					
81 ±4 ±4	CAPRARO	87	SPEC	−	200 $\pi^- A \rightarrow \pi^-\pi^0 A$
59.8±4.0	HUSTON	86	SPEC	+	202 $\pi^+ A \rightarrow \pi^+\pi^0 A$
71 ±7	JENSEN	83	SPEC	−	156–260 $\pi^- A \rightarrow \pi^-\pi^0 A$



$\Gamma(e^+e^-)$ Γ_{12}

NODE=M009W4

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
7.04 ±0.06 OUR FIT				
7.04 ±0.06 OUR AVERAGE				
7.048±0.057±0.050	900k	[80] AKHMETSHIN 07		$e^+e^- \to \pi^+\pi^-$
7.06 ±0.11 ±0.05	114k	[81,82] AKHMETSHIN 04	CMD2	$e^+e^- \to \pi^+\pi^-$
6.77 ±0.10 ±0.30		BARKOV 85	OLYA	$e^+e^- \to \pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7.12 ±0.02 ±0.11	800k	[83] ACHASOV 06	SND	$e^+e^- \to \pi^+\pi^-$
6.3 ±0.1		[84] BENAYOUN 98	RVUE	$e^+e^- \to \pi^+\pi^-$, $\mu^+\mu^-$

OCCUR=2

$\Gamma(\pi^0\gamma)$ Γ_8

NODE=M009W31

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
77±17±11	36500	[85] ACHASOV 03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
121±31		DOLINSKY 89	ND	$e^+e^- \to \pi^0\gamma$

$\Gamma(\eta\gamma)$ Γ_9

NODE=M009W32

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
62±17	[86] DOLINSKY 89	ND	$e^+e^- \to \eta\gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)$ Γ_{14}

NODE=M009W33

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.8±1.4±0.5	153	AKHMETSHIN 00	CMD2	0.6–0.97 $e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

[80] A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05. NODE=M009W4;LINKAGE=AK
[81] Using the GOUNARIS 68 parametrization with the complex phase of the ρ-ω interference. NODE=M009W4;LINKAGE=GS
[82] From a fit in the energy range 0.61 to 0.96 GeV. Update of AKHMETSHIN 02. NODE=M009W4;LINKAGE=P2
[83] Supersedes ACHASOV 05A. NODE=M009W4;LINKAGE=AC
[84] Using the data of BARKOV 85 in the hidden local symmetry model. NODE=M009W4;LINKAGE=K2
[85] Using Γ_{total}= 147.9 ± 1.3 MeV and B($\rho \to \pi^0\gamma$) from ACHASOV 03. NODE=M009W31;LINKAGE=AV
[86] Solution corresponding to constructive ω-ρ interference. NODE=M009W32;LINKAGE=L

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

NODE=M009233

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-)/\Gamma_{total}$ $\Gamma_{12}\Gamma_6/\Gamma^2$

NODE=M009G4

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
4.876±0.023±0.064	800k	[87,88] ACHASOV 06	SND	$e^+e^- \to \pi^+\pi^-$

[87] Supersedes ACHASOV 05A. NODE=M009G4;LINKAGE=AC
[88] A fit of the SND data from 400 to 1000 MeV using parameters of the $\rho(1450)$ and $\rho(1700)$ from a fit of the data of BARKOV 85, BISELLO 89 and ANDERSON 00A. NODE=M009G4;LINKAGE=SN

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\eta\gamma)/\Gamma_{total}$ $\Gamma_{12}\Gamma_9/\Gamma^2$

NODE=M009G1

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
1.42±0.10 OUR FIT				
1.45±0.12 OUR AVERAGE				
1.32±0.14±0.08	33k	[89] ACHASOV 07B	SND	0.6–1.38 $e^+e^- \to \eta\gamma$
1.50±0.65±0.09	17.4k	[90] AKHMETSHIN 05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
1.61±0.20±0.11	23k	[91,92] AKHMETSHIN 01B	CMD2	$e^+e^- \to \eta\gamma$
1.85±0.49		[93] DOLINSKY 89	ND	$e^+e^- \to \eta\gamma$

[89] From a combined fit of $\sigma(e^+e^- \to \eta\gamma)$ with $\eta \to 3\pi^0$ and $\eta \to \pi^+\pi^-\pi^0$, and fixing B($\eta \to 3\pi^0$) / B($\eta \to \pi^+\pi^-\pi^0$) = 1.44 ± 0.04. Recalculated by us from the cross section at the peak. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M009G1;LINKAGE=AH
[90] From the $\eta \to 2\gamma$ decay and using B($\eta \to \gamma\gamma$)= 39.43 ± 0.26%. NODE=M009G;LINKAGE=AH
[91] From the $\eta \to 3\pi^0$ decay and using B($\eta \to 3\pi^0$)= (32.24 ± 0.29) × 10^{-2}. NODE=M009G;LINKAGE=AK
[92] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). NODE=M009G;LINKAGE=BQ
[93] Recalculated by us from the cross section in the peak. NODE=M009G;LINKAGE=LP

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^0\gamma)/\Gamma_{total}$ — $\Gamma_{12}\Gamma_8/\Gamma^2$

NODE=M009G2
NODE=M009G2

VALUE (units 10^{-8})	EVTS	DOCUMENT ID		TECN	COMMENT
2.8 ±0.4 OUR FIT					
2.8 ±0.4 OUR AVERAGE					
$2.90^{+0.60}_{-0.55}\pm0.18$	18680	AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
$2.37\pm0.53\pm0.33$	36500	[94] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
$3.61\pm0.74\pm0.49$	10625	[95] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

[94] 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

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

NODE=M009G2;LINKAGE=LP

$\Gamma(e^+e^-)/\Gamma_{total} \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — $\Gamma_{12}\Gamma_{13}/\Gamma^2$

NODE=M009G3
NODE=M009G3

VALUE (units 10^{-9})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.58^{+2.46}_{-1.64}\pm1.56$	1.2M	[96] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$

[96] Statistical significance in less than 3 σ.

NODE=M009G3;LINKAGE=AC

$\rho(770)$ BRANCHING RATIOS

NODE=M009235

$\Gamma(\pi^\pm\eta)/\Gamma(\pi\pi)$ — Γ_4/Γ_1

NODE=M009R4
NODE=M009R4

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<60	84	FERBEL	66	HBC	$\pm$	$\pi^\pm p$ above 2.5

$\Gamma(\pi^\pm\pi^+\pi^-\pi^0)/\Gamma(\pi\pi)$ — Γ_5/Γ_1

NODE=M009R1
NODE=M009R1

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<20	84	FERBEL	66	HBC	$\pm$	$\pi^\pm p$ above 2.5
• • • We do not use the following data for averages, fits, limits, etc. • • •						
35 ± 40		JAMES	66	HBC	+	2.1 $\pi^+ p$

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-)$ — Γ_{11}/Γ_6

NODE=M009R5
NODE=M009R5

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT
4.60±0.28 OUR FIT				
4.6 ±0.2 ±0.2	ANTIPOV	89	SIGM	π^- Cu $\to \mu^+\mu^-\pi^-$ Cu
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$8.2\ ^{+1.6}_{-3.6}$	[97] ROTHWELL	69	CNTR	Photoproduction
$5.6\ \pm1.5$	[98] WEHMANN	69	OSPK	12 π^- C, Fe
$9.7\ ^{+3.1}_{-3.3}$	[99] HYAMS	67	OSPK	11 π^- Li, H

$\Gamma(e^+e^-)/\Gamma(\pi\pi)$ — Γ_{12}/Γ_1

NODE=M009R3
NODE=M009R3

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.40 ± 0.05	[100] BENAKSAS	72	OSPK	$e^+e^- \to \pi^+\pi^-$

$\Gamma(\eta\gamma)/\Gamma_{total}$ — Γ_9/Γ

NODE=M009R7
NODE=M009R7

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
3.00±0.21 OUR FIT						
2.90±0.32 OUR AVERAGE						
$2.79\pm0.34\pm0.03$	33k	[101] ACHASOV	07B	SND		0.6–1.38 $e^+e^- \to \eta\gamma$
$3.6\ \pm0.9$		[102] ANDREWS	77	CNTR	0	6.7–10 γCu
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$3.21\pm1.39\pm0.20$	17.4k	[103,104] AKHMETSHIN	05	CMD2		0.60-1.38 $e^+e^- \to \eta\gamma$
$3.39\pm0.42\pm0.23$		[102,105,106] AKHMETSHIN	01B	CMD2		$e^+e^- \to \eta\gamma$
$1.9\ ^{+0.6}_{-0.8}$		[107] BENAYOUN	96	RVUE		0.54-1.04 $e^+e^- \to \eta\gamma$
$4.0\ \pm1.1$		[102,104] DOLINSKY	89	ND		$e^+e^- \to \eta\gamma$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M009R13

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.8±0.9 OUR FIT						
1.8±0.9±0.3		153	AKHMETSHIN	00	CMD2	0.6–0.97 $e^+e^- \to \pi^+\pi^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<20	90		KURDADZE	88	OLYA	$e^+e^- \to \pi^+\pi^-\pi^+\pi^-$

$\Gamma(\pi^+\pi^-\pi^+\pi^-)/\Gamma(\pi\pi)$ Γ_{14}/Γ_1

NODE=M009R11

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<15	90	ERBE	69	HBC	0	2.5–5.8 γp
<20		CHUNG	68	HBC	0	3.2,4.2 $\pi^- p$
<20	90	HUSON	68	HLBC	0	16.0 $\pi^- p$
<80		JAMES	66	HBC	0	2.1 $\pi^+ p$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M009R10

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.01^{+0.54}_{-0.36}\pm0.34$		1.2M	[108] ACHASOV	03D	RVUE	0.44–2.00 $e^+e^- \to \pi^+\pi^-\pi^0$
<1.2	90		VASSERMAN	88B	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi\pi)$ Γ_{13}/Γ_1

NODE=M009R6

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
~ 0.01		BRAMON	86	RVUE	0	$J/\psi \to \omega\pi^0$
<0.01	84	[109] ABRAMS	71	HBC	0	3.7 $\pi^+ p$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ Γ_{15}/Γ

NODE=M009R8

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.4	90	AULCHENKO	87C	ND	0	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2	90	KURDADZE	86	OLYA	0	$e^+e^- \to \pi^+\pi^-\pi^0\pi^0$

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

NODE=M009R12

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.0099±0.0016 OUR FIT					
0.0099±0.0016		[110] DOLINSKY	91	ND	$e^+e^- \to \pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0111±0.0014		[111] VASSERMAN	88	ND	$e^+e^- \to \pi^+\pi^-\gamma$
<0.005	90	[112] VASSERMAN	88	ND	$e^+e^- \to \pi^+\pi^-\gamma$

OCCUR=2

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

NODE=M009R9

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$6.21^{+1.28}_{-1.18}\pm0.39$	18680	[113,114] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \pi^0\gamma$
5.22±1.17±0.75	36500	[114,115] ACHASOV	03	SND	0.60–0.97 $e^+e^- \to \pi^0\gamma$
6.8 ±1.7		[116] BENAYOUN	96	RVUE	0.54-1.04 $e^+e^- \to \pi^0\gamma$
7.9 ±2.0		[114] DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$

$\Gamma(\pi^0 e^+e^-)/\Gamma_{total}$ Γ_{16}/Γ

NODE=M009R15

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	ACHASOV	08	SND	0.36–0.97 $e^+e^- \to \pi^0 e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.6		AKHMETSHIN	05A	CMD2	0.72-0.84 e^+e^-

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$ — Γ_{17}/Γ

NODE=M009R16
NODE=M009R16

VALUE (units 10^{-5})	*DOCUMENT ID*	*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.7	AKHMETSHIN 05A	CMD2	0.72-0.84 $e^+ e^-$

$\Gamma(\pi^0 \pi^0 \gamma)/\Gamma_{\text{total}}$ — Γ_{10}/Γ

NODE=M009R14
NODE=M009R14

VALUE (units 10^{-5})	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
4.5±0.8 OUR FIT				
$4.5^{+0.9}_{-0.8}$ OUR AVERAGE				
$5.2^{+1.5}_{-1.3}\pm0.6$	190	[117] AKHMETSHIN 04B	CMD2	0.6–0.97 $e^+ e^- \to \pi^0 \pi^0 \gamma$
$4.1^{+1.0}_{-0.9}\pm0.3$	295	[118] ACHASOV 02F	SND	0.36–0.97 $e^+ e^- \to \pi^0 \pi^0 \gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$4.8^{+3.4}_{-1.8}\pm0.5$	63	[119] ACHASOV 00G	SND	$e^+ e^- \to \pi^0 \pi^0 \gamma$

OCCUR=2

[97] Possibly large ρ-ω interference leads us to increase the minus error. NODE=M009R5;LINKAGE=R

[98] Result contains 11 ± 11% correction using SU(3) for central value. The error on the correction takes account of possible ρ-ω interference and the upper limit agrees with the upper limit of $\omega \to \mu^+ \mu^-$ from this experiment. NODE=M009R5;LINKAGE=W

[99] HYAMS 67's mass resolution is 20 MeV. The ω region was excluded. NODE=M009R5;LINKAGE=H

[100] The ρ' contribution is not taken into account. NODE=M009R;LINKAGE=KS

[101] ACHASOV 07B reports $[B(\rho(770) \to \eta\gamma)] \times [B(\rho(770) \to e^+ e^-)] = (1.32 \pm 0.14 \pm 0.08) \times 10^{-8}$. We divide by our best value $B(\rho(770) \to e^+ e^-) = (4.72 \pm 0.05) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Supersedes ACHASOV 00D and ACHASOV 06A. NODE=M009R7;LINKAGE=AO

[102] Solution corresponding to constructive ω-ρ interference. NODE=M009R7;LINKAGE=A

[103] Using $B(\rho \to e^+ e^-) = (4.67 \pm 0.09) \times 10^{-5}$ and $B(\eta \to \gamma\gamma) = 39.43 \pm 0.26\%$. NODE=M009R;LINKAGE=AK

[104] Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma^2_{\text{total}}$. NODE=M009R7;LINKAGE=AZ

[105] The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). NODE=M009R;LINKAGE=BQ

[106] Using $B(\rho \to e^+ e^-) = (4.75 \pm 0.10) \times 10^{-5}$ from AKHMETSHIN 02 and $B(\eta \to 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. NODE=M009R;LINKAGE=BX

[107] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. Constructive ρ-ω interference solution. NODE=M009R7;LINKAGE=C

[108] Statistical significance is less than 3σ. NODE=M009R;LINKAGE=NS

[109] Model dependent, assumes I = 1, 2, or 3 for the 3π system. NODE=M009R6;LINKAGE=G

[110] Bremsstrahlung from a decay pion and for photon energy above 50 MeV. NODE=M009R12;LINKAGE=J

[111] Superseded by DOLINSKY 91. NODE=M009R12;LINKAGE=I

[112] Structure radiation due to quark rearrangement in the decay. NODE=M009R12;LINKAGE=N

[113] Using $B(\rho \to e^+ e^-) = (4.67 \pm 0.09) \times 10^{-5}$. NODE=M009R9;LINKAGE=AK

[114] Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^0\gamma)/\Gamma^2_{\text{total}}$. NODE=M009R9;LINKAGE=BZ

[115] Using $B(\rho \to e^+ e^-) = (4.54 \pm 0.10) \times 10^{-5}$. NODE=M009R9;LINKAGE=AS

[116] Reanalysis of DRUZHININ 84, DOLINSKY 89, and DOLINSKY 91 taking into account a triangle anomaly contribution. NODE=M009R9;LINKAGE=A

[117] This branching ratio includes the conventional VMD mechanism $\rho \to \omega\pi^0$, $\omega \to \pi^0\gamma$, and the new decay mode $\rho \to f_0(600)\gamma$, $f_0(600) \to \pi^0\pi^0$ with a branching ratio $(2.0^{+1.1}_{-0.9} \pm 0.3) \times 10^{-5}$ differing from zero by 2.0 standard deviations. NODE=M009R14;LINKAGE=AH

[118] This branching ratio includes the conventional VMD mechanism $\rho \to \omega\pi^0$, $\omega \to \pi^0\gamma$ and the new decay mode $\rho \to f_0(600)\gamma$, $f_0(600) \to \pi^0\pi^0$ with a branching ratio $(1.9^{+0.9}_{-0.8} \pm 0.4) \times 10^{-5}$ differing from zero by 2.4 standard deviations. Supersedes ACHASOV 00G. NODE=M009R;LINKAGE=FF

[119] Superseded by ACHASOV 02F. NODE=M009R;LINKAGE=GF

$\rho(770)$ REFERENCES

NODE=M009

ACHASOV	08	JETP 107 61	M.N. Achasov *et al.*	(SND Collab.)	REFID=52258
		Translated from ZETF 134 80.			
FUJIKAWA	08	PR D78 072006	M. Fujikawa *et al.*	(BELLE Collab.)	REFID=52536
ACHASOV	07B	PR D76 077101	M.N. Achasov *et al.*	(SND Collab.)	REFID=51942
AKHMETSHIN	07	PL B648 28	R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51615
ACHASOV	06	JETP 103 380	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=51113
		Translated from ZETF 130 437.			
ACHASOV	06A	PR D74 014016	M.N. Achasov *et al.*	(SND Collab.)	REFID=51133
AULCHENKO	06	JETPL 84 413	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51513
		Translated from ZETFP 84 491.			
ACHASOV	05A	JETP 101 1053	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=51045
		Translated from ZETF 128 1201.			

AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50330
AKHMETSHIN	05A	PL B613 29	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=50508
ALOISIO	05	PL B606 12	A. Aloisio *et al.*	(KLOE Collab.)	REFID=51112
AULCHENKO	05	JETPL 82 743	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51060
		Translated from ZETFP 82 841.			
SCHAEL	05C	PRPL 421 191	S. Schael *et al.*	(ALEPH Collab.)	REFID=50845
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49609
AKHMETSHIN	04B	PL B580 119	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=49610
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
ALOISIO	03	PL B561 55	A. Aloisio *et al.*	(KLOE Collab.)	REFID=49404
SANZ-CILLERO	03	EPJ C27 587	J.J. Sanz-Cillero, A. Pich		REFID=49399
ACHASOV	02	PR D65 032002	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48549
ACHASOV	02F	PL B537 201	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=48816
AKHMETSHIN	02	PL B527 161	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48565
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=48167
COLANGELO	01	NP B603 125	G. Colangelo, J. Gasser, H. Leytwyler		REFID=49180
PICH	01	PR D63 093005	A. Pich, J. Portoles		REFID=48313
ACHASOV	00	EPJ C12 25	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47417
ACHASOV	00D	JETPL 72 282	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47882
		Translated from ZETFP 72 411.			
ACHASOV	00G	JETPL 71 355	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=47929
		Translated from ZETFP 71 519.			
AKHMETSHIN	00	PL B475 190	R.R. Akhmetshin *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=47421
ANDERSON	00A	PR D61 112002	S. Anderson *et al.*	(CLEO Collab.)	REFID=47468
ABELE	99E	PL B469 270	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=47414
BENAYOUN	98	EPJ C2 269	M. Benayoun *et al.*	(IPNP, NOVO, ADLD+)	REFID=45859
BREITWEG	98B	EPJ C2 247	J. Breitweg *et al.*	(ZEUS Collab.)	REFID=46354
GARDNER	98	PR D57 2716	S. Gardner, H.B. O'Connell		REFID=46366
Also		PR D62 019903 (erratum)	S. Gardner, H.B. O'Connell		REFID=47981
ABELE	97	PL B391 191	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45415
ADAMS	97	ZPHY C74 237	M.R. Adams *et al.*	(E665 Collab.)	REFID=45533
BARATE	97M	ZPHY C76 15	R. Barate *et al.*	(ALEPH Collab.)	REFID=45622
BERTIN	97C	PL B408 476	A. Bertin *et al.*	(OBELIX Collab.)	REFID=45701
BOGOLYUB...	97	PAN 60 46	M.Y. Bogolyubsky *et al.*	(MOSU, SERP)	REFID=45393
		Translated from YAF 60 53.			
O'CONNELL	97	NP A623 559	H.B. O'Connell *et al.*	(ADLD)	REFID=45860
BENAYOUN	96	ZPHY C72 221	M. Benayoun *et al.*	(IPNP, NOVO)	REFID=45753
BERNICHA	94	PR D50 4454	A. Bernicha, G. Lopez Castro, J. Pestieau	(LOUV+)	REFID=44097
WEIDENAUER	93	ZPHY C59 387	P. Weidenauer *et al.*	(ASTERIX Collab.)	REFID=43585
AGUILAR-...	91	ZPHY C50 405	M. Aguilar-Benitez *et al.*	(LEBC-EHS Collab.)	REFID=41637
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky *et al.*	(NOVO)	REFID=41369
ANTIPOV	89	ZPHY C42 185	Y.M. Antipov *et al.*	(SERP, JINR, BGNA+)	REFID=40739
BISELLO	89	PL B220 321	D. Bisello *et al.*	(DM2 Collab.)	REFID=40740
DOLINSKY	89	ZPHY C42 511	S.I. Dolinsky *et al.*	(NOVO)	REFID=41003
DUBNICKA	89	JPG 15 1349	S. Dubnicka *et al.*	(JINR, SLOV)	REFID=44082
GESHKEN...	89	ZPHY C45 351	B.V. Geshkenbein	(ITEP)	REFID=41017
KURDADZE	88	JETPL 47 512	L.M. Kurdadze *et al.*	(NOVO)	REFID=41121
		Translated from ZETFP 47 432.			
VASSERMAN	88	SJNP 47 1035	I.B. Vasserman *et al.*	(NOVO)	REFID=41019
		Translated from YAF 47 1635.			
VASSERMAN	88B	SJNP 48 480	I.B. Vasserman *et al.*	(NOVO)	REFID=41020
		Translated from YAF 48 753.			
AULCHENKO	87C	IYF 87-90 Preprint	V.M. Aulchenko *et al.*	(NOVO)	REFID=41370
CAPRARO	87	NP B288 659	L. Capraro *et al.*	(CLER, FRAS, MILA+)	REFID=40003
BRAMON	86	PL B173 97	A. Bramon, J. Casulleras	(BARC)	REFID=22102
HUSTON	86	PR D33 3199	J. Huston *et al.*	(ROCH, FNAL, MINN)	REFID=20137
KURDADZE	86	JETPL 43 643	L.M. Kurdadze *et al.*	(NOVO)	REFID=40287
		Translated from ZETFP 43 497.			
BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)	REFID=20134
DRUZHININ	84	PL 144B 136	V.P. Druzhinin *et al.*	(NOVO)	REFID=20561
CHABAUD	83	NP B223 1	V. Chabaud *et al.*	(CERN, CRAC, MPIM)	REFID=20131
JENSEN	83	PR D27 26	T. Jensen *et al.*	(ROCH, FNAL, MINN)	REFID=20132
HEYN	81	ZPHY C7 169	M.F. Heyn, C.B. Lang	(GRAZ)	REFID=20129
BOHACIK	80	PR D21 1342	J. Bohacik, H. Kuhnelt	(SLOV, WIEN)	REFID=20128
LANG	79	PR D19 956	C.B. Lang, A. Mas-Parareda	(GRAZ)	REFID=20126
BARTALUCCI	78	NC 44A 587	S. Bartalucci *et al.*	(DESY, FRAS)	REFID=20122
WICKLUND	78	PR D17 1197	A.B. Wicklund *et al.*	(ANL)	REFID=20124
ANDREWS	77	PRL 38 198	D.E. Andrews *et al.*	(ROCH)	REFID=20120
DEUTSCH...	76	NP B103 426	M. Deutschmann *et al.*	(AACH3, BERL, BONN+)	REFID=20119
ENGLER	74	PR D10 2070	A. Engler *et al.*	(CMU, CASE)	REFID=20110
ESTABROOKS	74	NP B79 301	P.G. Estabrooks, A.D. Martin	(DURH)	REFID=20111
GRAYER	74	NP B75 189	G. Grayer *et al.*	(CERN, MPIM)	REFID=20113
BYERLY	73	PR D7 637	W.L. Byerly *et al.*	(MICH)	REFID=20104
GLADDING	73	PR D8 3721	G.E. Gladding *et al.*	(HARV)	REFID=20106
HYAMS	73	NP B64 134	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20107
PROTOPOP...	73	PR D7 1279	S.D. Protopopescu *et al.*	(LBL)	REFID=20108
BALLAM	72	PR D5 545	J. Ballam *et al.*	(SLAC, LBL, TUFTS)	REFID=20094
BENAKSAS	72	PL 39B 289	D. Benaksas *et al.*	(ORSAY)	REFID=20096
JACOBS	72	PR D6 1291	L.D. Jacobs	(SACL)	REFID=20101
RATCLIFF	72	PL 38B 345	B.N. Ratcliff *et al.*	(SLAC)	REFID=20102
ABRAMS	71	PR D4 653	G.S. Abrams *et al.*	(LBL)	REFID=20090
ALVENSLEB...	70	PRL 24 786	H. Alvensleben *et al.*	(DESY)	REFID=20085
BIGGS	70	PRL 24 1197	P.J. Biggs *et al.*	(DARE)	REFID=20087
ERBE	69	PR 188 2060	R. Erbe *et al.*	(German Bubble Chamber Collab.)	REFID=20074
MALAMUD	69	Argonne Conf. 93	E.I. Malamud, P.E. Schlein	(UCLA)	REFID=20077
REYNOLDS	69	PR 184 1424	B.G. Reynolds *et al.*	(FSU)	REFID=20080
ROTHWELL	69	PRL 23 1521	P.L. Rothwell *et al.*	(NEAS)	REFID=20082
WEHMANN	69	PR 178 2095	A.A. Wehmann *et al.*	(HARV, CASE, SLAC+)	REFID=20084
ARMENISE	68	NC 54A 999	N. Armenise *et al.*	(BARI, BGNA, FIRZ+)	REFID=20054
BATON	68	PR 176 1574	J.P. Baton, G. Laurens	(SACL)	REFID=20056
CHUNG	68	PR 165 1491	S.U. Chung *et al.*	(LRL)	REFID=20059
FOSTER	68	NP B6 107	M. Foster *et al.*	(CERN, CDEF)	REFID=20061
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai		REFID=48054
HUSON	68	PL 28B 208	R. Huson *et al.*	(ORSAY, MILA, UCLA)	REFID=20062
HYAMS	68	NP B7 1	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20063
LANZEROTTI	68	PR 166 1365	L.J. Lanzerotti *et al.*	(HARV)	REFID=20068
PISUT	68	NP B6 325	J. Pisut, M. Roos	(CERN)	REFID=20070
ASBURY	67B	PRL 19 865	J.G. Asbury *et al.*	(DESY, COLU)	REFID=20038
BACON	67	PR 157 1263	T.C. Bacon *et al.*	(BNL)	REFID=20039
EISNER	67	PR 164 1699	R.L. Eisner *et al.*	(PURD)	REFID=20046
HUWE	67	PL 24B 252	D.O. Huwe *et al.*	(COLU)	REFID=20049
HYAMS	67	PL 24B 634	B.D. Hyams *et al.*	(CERN, MPIM)	REFID=20050
MILLER	67B	PR 153 1423	D.H. Miller *et al.*	(PURD)	REFID=20051
ALFF-...	66	PR 145 1072	C. Alff-Steinberger *et al.*	(COLU, RUTG)	REFID=10762
FERBEL	66	PL 21 111	T. Ferbel	(ROCH)	REFID=20028
HAGOPIAN	66	PR 145 1128	V. Hagopian *et al.*	(PENN, SACL)	REFID=20030
HAGOPIAN	66B	PR 152 1183	V. Hagopian, Y.L. Pan	(PENN, LRL)	REFID=20031
JACOBS	66B	UCRL 16877	L.D. Jacobs	(LRL)	REFID=20033
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)	REFID=10770
ROSS	66	PR 149 1172	M. Ross, L. Stodolsky		REFID=46380
SOEDING	66	PL B19 702	P. Soeding		REFID=46385
WEST	66	PR 149 1089	E. West *et al.*	(WISC)	REFID=20035
BLIEDEN	65	PL 19 444	H.R. Blieden *et al.*		REFID=20016
CARMONY	64	PRL 12 254	D.D. Carmony *et al.*	(UCB)	REFID=20578
GOLDHABER	64	PRL 12 336	G. Goldhaber *et al.*	(LRL, UCB)	REFID=20013
ABOLINS	63	PRL 11 381	M.A. Abolins *et al.*	(UCSD)	REFID=20006

OTHER RELATED PAPERS

AMBROSINO	09	PL B670 285	F. Ambrosino *et al.*	(KLOE Collab.)	REFID=52658
BENAYOUN	08	EPJ C55 199	M. Benayoun *et al.*		REFID=52172
FLOREZ-BAEZ	07	PR D76 096010	F.V. Florez-Baez *et al.*		REFID=52065
SANCHEZ	07	PR D76 033001	G. Toledo Sanchez, J.L. Garcia-Luna, V. Gonzalez-Enciso		REFID=51904
AULCHENKO	06	JETPL 84 413	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51513
		Translated from ZETFP 84 491.			
DAVIER	06	RMP 78 1043	M. Davier, A. Hocker, Z. Zhang	(LALO, PARIN+)	REFID=51517
MALTMAN	06	PR D73 013004	K. Maltman, C.E. Wolfe		REFID=51114
AULCHENKO	05	JETPL 82 743	V.M. Aulchenko *et al.*	(Novosibirsk CMD-2 Collab.)	REFID=51060
		Translated from ZETFP 82 841.			
GHOZZI	04	PL B583 222	S. Ghozzi, F. Jegerlehner		REFID=49704
ACHASOV	03C	JETP 96 789	M.N. Achasov *et al.*	(Novosibirsk SND Collab.)	REFID=49576
		Translated from ZETF 123 899.			
AZIMOV	03	EPJ A16 209	Ya.I. Aximov		REFID=49400
BENAYOUN	03	EPJ C29 397	M. Benayoun *et al.*		REFID=49477
BENAYOUN	03B	EPJ C31 525	M. Benayoun *et al.*		REFID=49591
DAVIER	03	EPJ C27 497	M. Davier *et al.*		REFID=49389
DAVIER	03A	NPBPS 123 47	M. Davier *et al.*		REFID=49706
DAVIER	03B	EPJ C31 503	M. Davier *et al.*		REFID=49703
CIRIGLIANO	02	EPJ C23 121	V. Cirigliano *et al.*	(VIEN, VALE, MARS)	REFID=50523
BENAYOUN	01	EPJ C22 503	M. Benayoun, H.B. O'Connell		REFID=48570
CIRIGLIANO	01	PL B513 361	V. Cirigliano, G. Ecker, H. Neufeld		REFID=48651
CZYZ	01	EPJ C18 497	H. Czyz, J.J. Kuhn		REFID=48649
EIDELMAN	01	NPBPS 98 281	S. Eidelman		REFID=48648
FEUILLAT	01	PL B501 37	M. Feuillat, J.L. Lucio, M.J. Pestieau		REFID=48320
GOKALP	01B	EPJ C22 327	A. Gokalp, Y. Sarac, O. Yilmaz		REFID=48568
MELNIKOV	01	IJMP A16 4591	K. Melnikov		REFID=48650
ADLOFF	00F	EPJ C13 371	C. Adloff *et al.*	(H1 Collab.)	REFID=47934
ACHASOV	99F	JETPL 69 7	M.N. Achasov, N.N. Achasov		REFID=49707
ACKERSTAFF	99F	EPJ C7 571	K. Ackerstaff *et al.*		REFID=49708
BENAYOUN	99	PR D59 074020	M. Benayoun *et al.*		REFID=46897
EIDELMAN	99	NPBPS 76 319	S. Eidelman, V. Ivanchenko		REFID=47529
MARCO	99	PL B470 20	E. Marco *et al.*		REFID=47415
ROOS	99	APS 49 N2 vii	M. Roos		REFID=46900
ALEMANY	98	EPJ C2 123	R. Alemany *et al.*		REFID=47528
ABELE	97B	PL B402 195	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45525
ABELE	97F	PL B411 354	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=45756
BIJNENS	96	PL B374 210	J. Bijnens *et al.*	(NORD, BERN, WIEN+)	REFID=45894
BENAYOUN	93	ZPHY C58 31	M. Benayoun *et al.*	(CDEF, CERN, BARI)	REFID=43178
LAFFERTY	93	ZPHY C60 659	G.D. Lafferty	(MCHS)	REFID=43715
KAMAL	92	PL B284 421	A.N. Kamal, Q.P. Xu	(ALBE)	REFID=43166
KUHN	90	ZPHY C48 445	J.H. Kuhn *et al.*	(MPIM)	REFID=45862
ERKAL	85	ZPHY C29 485	C. Erkal, M.G. Olsson	(WISC)	REFID=20136
RYBICKI	85	ZPHY C28 65	K. Rybicki, I. Sakrejda	(CRAC)	REFID=20135
KURDADZE	83	JETPL 37 733	L.M. Kurdadze *et al.*	(NOVO)	REFID=20133
		Translated from ZETFP 37 613.			
ALEKSEEV	82	JETP 55 591	E.A. Alekseeva *et al.*	(KIAE)	REFID=20130
		Translated from ZETF 82 1007.			
KENNEY	62	PR 126 736	V.P. Kenney, W.D. Shephard, C.D. Gall	(KNTY)	REFID=20003
SAMIOS	62	PRL 9 139	N.P. Samios *et al.*	(BNL, CUNY, COLU+)	REFID=20004
XUONG	62	PR 128 1849	H. Nguyen Ngoc, G.R. Lynch	(LRL)	REFID=20005
ANDERSON	61	PRL 6 365	J.A. Anderson *et al.*	(LRL)	REFID=20001
ERWIN	61	PRL 6 628	A.R. Erwin *et al.*	(WISC)	REFID=20002