$\rho(1450)$

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

$\rho(1450)$ MASS

$\rho(1450)$ MASS

VALUE (MeV)	DOCUMENT ID

1465±25 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.

$\eta\rho^0$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1506±11	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \rightarrow \eta\pi^+\pi^-$
1500±10	7.4k	[2] ACHASOV	18	SND	1.22–2.00 $e^+e^- \rightarrow \eta\pi^+\pi^-$
1497±14		[3] AKHMETSHIN	01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
1421±15		[4] AKHMETSHIN	00D	CMD2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
1470±20		ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
1446±10		FUKUI	88	SPEC	8.95 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \rightarrow \gamma\gamma$ decays used.

[2] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively.

[3] Using the data of AKHMETSHIN 01B on $e^+e^- \rightarrow \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \rightarrow \eta\pi^+\pi^-$.

[4] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed.

$\omega\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1510± 7	10.2k	[1] ACHASOV	16D	SND	1.05–2.00 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
$1544\pm22^{+11}_{-46}$	821	[2] MATVIENKO	15	BELL	$\overline{B}^0 \rightarrow D^{*+}\omega\pi^-$
1491±19	7815	[3] ACHASOV	13	SND	1.05–2.00 $e^+e^- \rightarrow \pi^0\pi^0\gamma$
1582±17±25	2382	[4] AKHMETSHIN	03B	CMD2	$e^+e \rightarrow \pi^0\pi^0\gamma$
$1349\pm25^{+10}_{-5}$	341	[5] ALEXANDER	01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
1523±10		[6] EDWARDS	00A	CLE2	$\tau^- \rightarrow \omega\pi^-\nu_\tau$
1463±25		[7] CLEGG	94	RVUE	
1250		[8] ASTON	80C	OMEG	20–70 $\gamma p \rightarrow \omega\pi^0 p$
1290±40		[8] BARBER	80C	SPEC	3–5 $\gamma p \rightarrow \omega\pi^0 p$

[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.

[2] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \rightarrow \pi\pi$ and $\rho(1450) \rightarrow \omega\pi$ decays.

[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.
[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.
[5] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width.
[6] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.
[7] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.
[8] Not separated from $b_1(1235)$, not pure $J^P = 1^-$ effect.

4π MODE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1435±40	ABELE	01B	CBAR	0.0 $\overline{p}n \to 2\pi^- 2\pi^0 \pi^+$
1350±50	ACHASOV	97	RVUE	$e^+e^- \to 2(\pi^+\pi^-)$
1449± 4	[1] ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$

[1] Not clear whether this observation has I=1 or 0.

ππ MODE

VALUE (MeV)			EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •							
1326.35	± 3.46			[1] BARTOS	17	RVUE	$e^+e^- \to \pi^+\pi^-$
1342.31	±46.62			[2] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$
1373.83	±11.37			[3] BARTOS	17A	RVUE	$\tau^- \to \pi^-\pi^0\nu_\tau$
1429	±41		20k	[4] LEES	17C	BABR	$J/\psi \to \pi^+\pi^-\pi^0$
1350	±20	$^{+20}_{-30}$	63.5k	[5] ABRAMOWICZ	12	ZEUS	$ep \to e\pi^+\pi^- p$
1493	±15			[6] LEES	12G	BABR	$e^+e^- \to \pi^+\pi^-\gamma$
1446	± 7	±28	5.4M	[7,8] FUJIKAWA	08	BELL	$\tau^- \to \pi^-\pi^0\nu_\tau$
1328	±15			[9] SCHAEL	05C	ALEP	$\tau^- \to \pi^-\pi^0\nu_\tau$
1406	±15		87k	[7,10] ANDERSON	00A	CLE2	$\tau^- \to \pi^-\pi^0\nu_\tau$
∼ 1368				[11] ABELE	99C	CBAR	0.0 $\overline{p}d \to \pi^+\pi^-\pi^- p$
1348	±33			BERTIN	98	OBLX	0.05–0.405 $\overline{n}p \to 2\pi^+\pi^-$
1411	±14			[12] ABELE	97	CBAR	$\overline{p}n \to \pi^-\pi^0\pi^0$
1370	$^{+90}_{-70}$			ACHASOV	97	RVUE	$e^+e^- \to \pi^+\pi^-$
1359	±40			[10] BERTIN	97C	OBLX	0.0 $\overline{p}p \to \pi^+\pi^-\pi^0$
1282	±37			BERTIN	97D	OBLX	0.05 $\overline{p}p \to 2\pi^+ 2\pi^-$
1424	±25			BISELLO	89	DM2	$e^+e^- \to \pi^+\pi^-$
1265.5	±75.3			DUBNICKA	89	RVUE	$e^+e^- \to \pi^+\pi^-$
1292	±17			[13] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C.
[2] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A.

[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08.
[4] From a Dalitz plot analysis in an isobar model with $\rho(1450)$ and $\rho(1700)$ masses and widths floating.
[5] Using the KUHN 90 parametrization of the pion form factor, neglecting $\rho-\omega$ interference.
[6] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit.
[7] From the GOUNARIS 68 parametrization of the pion form factor.
[8] $|F_\pi(0)|^2$ fixed to 1.
[9] 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. $\rho(1700)$ mass and width fixed at 1713 MeV and 235 MeV, respectively. Supersedes BARATE 97M.
[10] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively.
[11] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively.
[12] T-matrix pole.
[13] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively.

$K\overline{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1208 ±8 ±9	190k	[1] AAIJ	16N	LHCB		$D^0 \to K^0_S K^\pm \pi^\mp$
1422.8±6.5	27k	[2] ABELE	99D	CBAR	±	0.0 $\overline{p}p \to K^+ K^- \pi^0$

[1] Using the GOUNARIS 68 parameterization with fixed width.
[2] K-matrix pole. Isospin not determined, could be $\omega(1420)$.

$K\overline{K}^*(892)$ + c.c. MODE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1505±19±7	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

$m_{\rho(1450)^0} - m_{\rho(1450)^\pm}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−31.53±47.99	[1] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$, $\tau^- \to \pi^-\pi^0\nu_\tau$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08.

$\rho(1450)$ WIDTH

$\rho(1450)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400± 60 OUR ESTIMATE This is only an educated guess; the error given is larger than the error on the average of the published values.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
480±180	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. Systematic errors not evaluated.

$\eta\rho^0$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
321±27	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \rightarrow \eta\pi^+\pi^-$
280±20	7.4k	[2] ACHASOV	18	SND	1.22–2.00 $e^+e^- \rightarrow \eta\pi^+\pi^-$
226±44		[3] AKHMETSHIN	01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
211±31		[4] AKHMETSHIN	00D	CMD2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
230±30		ANTONELLI	88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$
60±15		FUKUI	88	SPEC	8.95 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \rightarrow \gamma\gamma$ decays used.

[2] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively.

[3] Using the data of AKHMETSHIN 01B on $e^+e^- \rightarrow \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \rightarrow \eta\pi^+\pi^-$.

[4] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed.

$\omega\pi$ MODE

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

[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.

[2] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming equal probabilities of the $\rho(1450) \rightarrow \pi\pi$ and $\rho(1450) \rightarrow \omega\pi$ decays.

[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.

[4] Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width.

[5] Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.

[6] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

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

4π MODE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
325±100	ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 2\pi^-2\pi^0\pi^+$

$\pi\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
324.13 ± 12.01		[1] BARTOS	17	RVUE	$e^+ e^- \to \pi^+ \pi^-$
492.17 ± 138.38		[2] BARTOS	17A	RVUE	$e^+ e^- \to \pi^+ \pi^-$
340.87 ± 23.84		[3] BARTOS	17A	RVUE	$\tau^- \to \pi^- \pi^0 \nu_\tau$
576 ± 29	20k	[4] LEES	17C	BABR	$J/\psi \to \pi^+ \pi^- \pi^0$
$460 \pm 30 {}^{+40}_{-45}$	63.5k	[5] ABRAMOWICZ	12	ZEUS	$e p \to e \pi^+ \pi^- p$
427 ± 31		[6] LEES	12G	BABR	$e^+ e^- \to \pi^+ \pi^- \gamma$
$434 \pm 16 \pm 60$	5.4M	[7,8] FUJIKAWA	08	BELL	$\tau^- \to \pi^- \pi^0 \nu_\tau$
468 ± 41		[9] SCHAEL	05C	ALEP	$\tau^- \to \pi^- \pi^0 \nu_\tau$
455 ± 41	87k	[7,10] ANDERSON	00A	CLE2	$\tau^- \to \pi^- \pi^0 \nu_\tau$
~ 374		[11] ABELE	99C	CBAR	0.0 $\overline{p} d \to \pi^+ \pi^- \pi^- p$
275 ± 10		BERTIN	98	OBLX	0.05–0.405 $\overline{n} p \to \pi^+ \pi^+ \pi^-$
343 ± 20		[12] ABELE	97	CBAR	$\overline{p} n \to \pi^- \pi^0 \pi^0$
310 ± 40		[10] BERTIN	97C	OBLX	0.0 $\overline{p} p \to \pi^+ \pi^- \pi^0$
236 ± 36		BERTIN	97D	OBLX	0.05 $\overline{p} p \to 2\pi^+ 2\pi^-$
269 ± 31		BISELLO	89	DM2	$e^+ e^- \to \pi^+ \pi^-$
391 ± 70		DUBNICKA	89	RVUE	$e^+ e^- \to \pi^+ \pi^-$
218 ± 46		[13] KURDADZE	83	OLYA	0.64–1.4 $e^+ e^- \to \pi^+ \pi^-$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of LEES 12G and ABLIKIM 16C.
[2] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, and AMBROSINO 11A.
[3] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of FUJIKAWA 08.
[4] From a Dalitz plot analysis in an isobar model with $\rho(1450)$ and $\rho(1700)$ masses and widths floating.
[5] Using the KUHN 90 parametrization of the pion form factor, neglecting ρ–ω interference.
[6] Using the GOUNARIS 68 parametrization of the pion form factor leaving the masses and widths of the $\rho(1450)$, $\rho(1700)$, and $\rho(2150)$ resonances as free parameters of the fit.
[7] From the GOUNARIS 68 parametrization of the pion form factor.
[8] $|F_\pi(0)|^2$ fixed to 1.
[9] 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. $\rho(1700)$ mass and width fixed at 1713 MeV and 235 MeV, respectively. Supersedes BARATE 97M.
[10] $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively.
[11] $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively.
[12] T-matrix pole.
[13] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively.

$K\overline{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$410 \pm 19 \pm 35$	190k	[1] AAIJ	16N	LHCB		$D^0 \to K^0_S K^\pm \pi^\mp$
146.5 ± 10.5	27k	[2] ABELE	99D	CBAR	$\pm$	0.0 $\overline{p} p \to K^+ K^- \pi^0$

[1] Using the GOUNARIS 68 parameterization with fixed mass.
[2] K-matrix pole. Isospin not determined, could be $\omega(1420)$.

$K\overline{K}^*(892)$ + c.c. MODE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$418\pm25\pm4$	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

$\Gamma_{\rho(1450)^0} - \Gamma_{\rho(1450)^\pm}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
151.30 ± 140.42	[1] BARTOS	17A	RVUE	$e^+e^- \to \pi^+\pi^-$, $\tau^- \to \pi^-\pi^0\nu_\tau$

[1] Applies the Unitary & Analytic Model of the pion electromagnetic form factor of DUBNICKA 10 to analyze the data of ACHASOV 06, AKHMETSHIN 07, AUBERT 09AS, AMBROSINO 11A, and FUJIKAWA 08.

$\rho(1450)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	seen
Γ_2	$\pi^+\pi^-$	seen
Γ_3	4π	seen
Γ_4	$\omega\pi$	
Γ_5	$a_1(1260)\pi$	
Γ_6	$h_1(1170)\pi$	
Γ_7	$\pi(1300)\pi$	
Γ_8	$\rho\rho$	
Γ_9	$\rho(\pi\pi)_{S\text{-wave}}$	
Γ_{10}	e^+e^-	seen
Γ_{11}	$\eta\rho$	seen
Γ_{12}	$a_2(1320)\pi$	not seen
Γ_{13}	$K\overline{K}$	seen
Γ_{14}	K^+K^-	seen
Γ_{15}	$K\overline{K}^*(892)$+ c.c.	possibly seen
Γ_{16}	$\pi^0\gamma$	
Γ_{17}	$\eta\gamma$	seen
Γ_{18}	$f_0(500)\gamma$	not seen
Γ_{19}	$f_0(980)\gamma$	not seen
Γ_{20}	$f_0(1370)\gamma$	not seen
Γ_{21}	$f_2(1270)\gamma$	not seen

$\rho(1450)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{10}/\Gamma$

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12	[1] DIEKMAN	88	RVUE	$e^+e^- \to \pi^+\pi^-$

$0.027^{+0.015}_{-0.010}$		[2] KURDADZE	83	OLYA	0.64–1.4 $e^+e^- \to \pi^+\pi^-$

[1] Using total width = 235 MeV.
[2] Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively.

$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{11}\Gamma_{10}/\Gamma$

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
335±27±20	13.4k	[1] GRIBANOV	20	CMD3	1.1–2.0 $e^+e^- \to \eta\pi^+\pi^-$
210±24±10		[2] LEES	18	BABR	$e^+e^- \to \eta\pi^+\pi^-$
74±20		[3] AKHMETSHIN	00D	CMD2	$e^+e^- \to \eta\pi^+\pi^-$
91±19		ANTONELLI	88	DM2	$e^+e^- \to \eta\pi^+\pi^-$

[1] Mass and width of the $\rho(770)$ fixed at 775 and 149 MeV, respectively; solution 2 of model 2, $\eta \to \gamma\gamma$ decays used.
[2] Includes non-resonant contribution. The selected fit model includes three ρ excited states. Model uncertainty is 20%.
[3] Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed.

$\Gamma(\eta\gamma) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_{10}/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<16.4	[1] AKHMETSHIN	05	CMD2	0.60-1.38 $e^+e^- \to \eta\gamma$
2.2±0.5±0.3	[2] AKHMETSHIN	01B	CMD2	$e^+e^- \to \eta\gamma$

[1] From 2γ decay mode of η using 1465 MeV and 310 MeV for the $\rho(1450)$ mass and width. Recalculated by us.
[2] Using the data of AKHMETSHIN 01B on $e^+e^- \to \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \to \eta\pi^+\pi^-$. Recalculated by us using width of 226 MeV.

$\Gamma(K\overline{K}^*(892)+c.c.) \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{15}\Gamma_{10}/\Gamma$

VALUE (eV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
127±15±6	AUBERT	08S	BABR	10.6 $e^+e^- \to K\overline{K}^*(892)\gamma$

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

$\Gamma(\omega\pi)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_4/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
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 $e^+e^- \to \pi^0\pi^0\gamma$

[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.
[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.

$\Gamma(\eta\rho)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{11}/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.3 ± 0.3	7.4k	[1] ACHASOV	18	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$
$4.3^{+1.1}_{-0.9}\pm0.2$	4.9k	[2] AULCHENKO	15	SND	1.22–2.00 $e^+e^- \to \eta\pi^+\pi^-$

[1] From the combined fit of AULCHENKO 15 and ACHASOV 18 in the model with the interfering $\rho(1450)$, $\rho(1700)$ and $\rho(2150)$ with the parameters of the $\rho(1450)$ and $\rho(1700)$ floating and the mass and width of the $\rho(2150)$ fixed at 2155 MeV and 320 MeV, respectively. The phases of the resonances are π, 0 and π, respectively.

[2] From a fit to the $e^+e^- \to \eta\pi^+\pi^-$ cross section with vector meson dominance model including $\rho(770)$, $\rho(1450)$, and $\rho(1700)$ decaying exclusively via $\eta\rho(770)$. Masses and widths of vector states are fixed to PDG 14. Coupling constants are assumed to be real.

$\Gamma(f_0(500)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{18}/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<4.0	90	ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(\pi^0\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{16}/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-9})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.3 ± 1.4	[1] ACHASOV	10D	SND	1.075–2.0 $e^+e^- \to \pi^0\gamma$

[1] From a fit of a VMD model with two effective resonances with masses of 1450 MeV and 1700 MeV to describe the excited vector states $\omega(1420)$, $\rho(1450)$, $\omega(1650)$, and $\rho(1700)$. Systematic errors not evaluated.

$\Gamma(f_0(980)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{19}/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<2.6	90	ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(f_0(1370)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{20}/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<3.5	90	ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

$\Gamma(f_2(1270)\gamma)/\Gamma_{total} \times \Gamma(e^+e^-)/\Gamma_{total}$ — $\Gamma_{21}/\Gamma \times \Gamma_{10}/\Gamma$

VALUE (units 10^{-9})	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[1] ACHASOV	11	SND	$e^+e^- \to \pi^0\pi^0\gamma$

[1] Using Breit-Wigner parametrization of the $\rho(1450)$ with mass and width of 1465 MeV and 400 MeV, respectively.

$\rho(1450)$ BRANCHING RATIOS

$\Gamma(\pi\pi)/\Gamma(4\pi)$ — Γ_1/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37 ± 0.10	[1,2] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included.
[2] Using ABELE 97.

$\Gamma(K^+K^-)/\Gamma(\pi^+\pi^-)$ — Γ_{14}/Γ_2

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
30.7±8.4±8.2	20k	[1] LEES	17C	BABR	$J/\psi \to h^+h^-\pi^0$

[1] From Dalitz plot analyses in isobar models.

$\Gamma(\omega\pi)/\Gamma_{total}$ — Γ_4/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	821	[1] MATVIENKO	15	BELL	$\overline{B}^0 \to D^{*+}\omega\pi^-$
seen	1.6k	ACHASOV	12	SND	$e^+e^- \to \pi^0\pi^0\gamma$
$\sim$ 0.21		CLEGG	94	RVUE	

[1] 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.

$\Gamma(\pi\pi)/\Gamma(\omega\pi)$ — Γ_1/Γ_4

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$\sim$ 0.32	CLEGG	94	RVUE

$\Gamma(\omega\pi)/\Gamma(4\pi)$ — Γ_4/Γ_3

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$<$0.14	CLEGG	88	RVUE

$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$ — Γ_5/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27±0.08	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included.

$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$ — Γ_6/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08±0.04	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included.

$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$ — Γ_7/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37±0.13	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included.

$\Gamma(\rho\rho)/\Gamma(4\pi)$ — Γ_8/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.11±0.05	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \to 5\pi$

[1] $\omega\pi$ not included.

$\Gamma(\rho(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$ — Γ_9/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17 ± 0.09	[1] ABELE	01B	CBAR	0.0 $\overline{p}n \rightarrow 5\pi$

[1] $\omega\pi$ not included.

$\Gamma(\eta\rho)/\Gamma_{\text{total}}$ — Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	[1] ACHASOV	14	SND	1.15–2.00 $e^+e^- \rightarrow \eta\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.04		DONNACHIE	87B	RVUE	

[1] From a phenomenological model based on vector meson dominance with $\rho(1450)$ and $\phi(1680)$ masses and widths from the PDG 12.

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ — Γ_{11}/Γ_4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.081 ± 0.020	[1,2] AULCHENKO	15	SND	1.22–2.00 $e^+e^- \rightarrow \eta\pi^+\pi^-$
~ 0.24	[3] DONNACHIE	91	RVUE	
>2	FUKUI	91	SPEC	8.95 $\pi^- p \rightarrow \omega\pi^0 n$

[1] From a fit to the $e^+e^- \rightarrow \eta\pi^+\pi^-$ cross section with vector meson dominance model including $\rho(770)$, $\rho(1450)$, and $\rho(1700)$ decaying exclusively via $\eta\rho(770)$. Masses and widths of vector states are fixed to PDG 14. Coupling constants are assumed to be real.
[2] Reports the inverse of the quoted value as 12.3 ± 3.1.
[3] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

$\Gamma(\pi\pi)/\Gamma(\eta\rho)$ — Γ_1/Γ_{11}

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.3 ± 0.4	[1] AULCHENKO	15	SND	1.22–2.00 $e^+e^- \rightarrow \eta\pi^+\pi^-$

[1] From a fit to the $e^+e^- \rightarrow \eta\pi^+\pi^-$ cross section with vector meson dominance model including $\rho(770)$, $\rho(1450)$, and $\rho(1700)$ decaying exclusively via $\eta\rho(770)$. Masses and widths of vector states are fixed to PDG 14. Coupling constants are assumed to be real.

$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$ — Γ_{12}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMELIN	00	VES	37 $\pi^- p \rightarrow \eta\pi^+\pi^- n$

$\Gamma(K\overline{K})/\Gamma(\omega\pi)$ — Γ_{13}/Γ_4

VALUE	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.08	[1] DONNACHIE	91	RVUE

[1] Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

$\Gamma(K\overline{K}^*(892)+\text{c.c.})/\Gamma_{\text{total}}$ — Γ_{15}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
possibly seen	COAN	04	CLEO	$\tau^- \rightarrow K^-\pi^-K^+\nu_\tau$

$\Gamma(\eta\gamma)/\Gamma_{total}$ Γ_{17}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	[1] ACHASOV	14	SND	1.15–2.00 $e^+e^- \rightarrow \eta\gamma$

[1] From a phenomenological model based on vector meson dominance with $\rho(1450)$ and $\phi(1680)$ masses and widths from the PDG 12.

ρ(1450) REFERENCES

GRIBANOV	20	JHEP 2001 112	S.S. Gribanov et al.	(CMD-3 Collab.)
ACHASOV	18	PR D97 012008	M.N. Achasov et al.	(SND Collab.)
LEES	18	PR D97 052007	J.P. Lees et al.	(BABAR Collab.)
BARTOS	17	PR D96 113004	E. Bartos et al.	
BARTOS	17A	IJMP A32 1750154	E. Bartos et al.	
LEES	17C	PR D95 072007	J.P. Lees et al.	(BABAR Collab.)
AAIJ	16N	PR D93 052018	R. Aaij et al.	(LHCb Collab.)
ABLIKIM	16C	PL B753 629	M. Ablikim et al.	(BESIII Collab.)
ACHASOV	16D	PR D94 112001	M.N. Achasov et al.	(SND Collab.)
AULCHENKO	15	PR D91 052013	V.M. Aulchenko et al.	(SND Collab.)
MATVIENKO	15	PR D92 012013	D. Matvienko et al.	(BELLE Collab.)
ACHASOV	14	PR D90 032002	M.N. Achasov et al.	(SND Collab.)
PDG	14	CP C38 070001	K. Olive et al.	(PDG Collab.)
ACHASOV	13	PR D88 054013	M.N. Achasov et al.	(SND Collab.)
ABRAMOWICZ	12	EPJ C72 1869	H. Abramowicz et al.	(ZEUS Collab.)
ACHASOV	12	JETPL 94 734	M.N. Achasov et al.	
		Translated from ZETFP 94 796.		
LEES	12G	PR D86 032013	J.P. Lees et al.	(BABAR Collab.)
PDG	12	PR D86 010001	J. Beringer et al.	(PDG Collab.)
ACHASOV	11	JETP 113 75	M.N. Achasov et al.	(SND Collab.)
		Translated from ZETF 140 87.		
AMBROSINO	11A	PL B700 102	F. Ambrosino et al.	(KLOE Collab.)
ACHASOV	10D	PR D98 112001	M.N. Achasov et al.	(SND Collab.)
DUBNICKA	10	APS 60 1	S. Dubnicka, A.Z. Dubnickova	
AUBERT	09AS	PRL 103 231801	B. Aubert et al.	(BABAR Collab.)
AUBERT	08S	PR D77 092002	B. Aubert et al.	(BABAR Collab.)
FUJIKAWA	08	PR D78 072006	M. Fujikawa et al.	(BELLE Collab.)
AKHMETSHIN	07	PL B648 28	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
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		Translated from ZETF 130 437.		
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
ALOISIO	05	PL B606 12	A. Aloisio et al.	(KLOE Collab.)
SCHAEL	05C	PRPL 421 191	S. Schael et al.	(ALEPH Collab.)
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
COAN	04	PRL 92 232001	T.E. Coan et al.	(CLEO Collab.)
AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
ABELE	01B	EPJ C21 261	A. Abele et al.	(Crystal Barrel Collab.)
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
ALEXANDER	01B	PR D64 092001	J.P. Alexander et al.	(CLEO Collab.)
AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin et al.	(Novosibirsk CMD-2 Collab.)
AMELIN	00	NP A668 83	D. Amelin et al.	(VES Collab.)
ANDERSON	00A	PR D61 112002	S. Anderson et al.	(CLEO Collab.)
EDWARDS	00A	PR D61 072003	K.W. Edwards et al.	(CLEO Collab.)
ABELE	99C	PL B450 275	A. Abele et al.	(Crystal Barrel Collab.)
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BERTIN	98	PR D57 55	A. Bertin et al.	(OBELIX Collab.)
ABELE	97	PL B391 191	A. Abele et al.	(Crystal Barrel Collab.)
ACHASOV	97	PR D55 2663	N.N. Achasov et al.	(NOVM)
BARATE	97M	ZPHY C76 15	R. Barate et al.	(ALEPH Collab.)
BERTIN	97C	PL B408 476	A. Bertin et al.	(OBELIX Collab.)
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CLEGG	94	ZPHY C62 455	A.B. Clegg, A. Donnachie	(LANC, MCHS)
BISELLO	91B	NPBPS B21 111	D. Bisello	(DM2 Collab.)
DOLINSKY	91	PRPL 202 99	S.I. Dolinsky et al.	(NOVO)
DONNACHIE	91	ZPHY C51 689	A. Donnachie, A.B. Clegg	(MCHS, LANC)
FUKUI	91	PL B257 241	S. Fukui et al.	(SUGI, NAGO, KEK, KYOT+)
KUHN	90	ZPHY C48 445	J.H. Kuhn et al.	(MPIM)
ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)
BISELLO	89	PL B220 321	D. Bisello et al.	(DM2 Collab.)

DUBNICKA	89	JP G15 1349	S. Dubnicka *et al.*	(JINR, SLOV)
ANTONELLI	88	PL B212 133	A. Antonelli *et al.*	(DM2 Collab.)
CLEGG	88	ZPHY C40 313	A.B. Clegg, A. Donnachie	(MCHS, LANC)
DIEKMAN	88	PRPL 159 99	B. Diekmann	(BONN)
FUKUI	88	PL B202 441	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)
ALBRECHT	87L	PL B185 223	H. Albrecht *et al.*	(ARGUS Collab.)
DONNACHIE	87B	ZPHY C34 257	A. Donnachie, A.B. Clegg	(MCHS, LANC)
DOLINSKY	86	PL B174 453	S.I. Dolinsky *et al.*	(NOVO)
BARKOV	85	NP B256 365	L.M. Barkov *et al.*	(NOVO)
KURDADZE	83	JETPL 37 733	L.M. Kurdadze *et al.*	(NOVO)
		Translated from ZETFP 37 613.		
ASTON	80C	PL 92B 211	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)
BARBER	80C	ZPHY C4 169	D.P. Barber *et al.*	(DARE, LANC, SHEF)
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai	