

$\rho(1450)$

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

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

$\rho(1450)$ 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)DOCUMENT IDTECNCOMMENT

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

1497 ± 14	¹ AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
1421 ± 15	² 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 Using the data of AKHMETSHIN 01B on $e^+e^- \rightarrow \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \rightarrow \eta\pi^+\pi^-$.² 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)EVTSDOCUMENT IDTECNCOMMENT

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

1582 ± 17 ± 25	2382	³ AKHMETSHIN 03B	CMD2	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
1349 ± 25 $^{+10}_{-5}$	341	⁴ ALEXANDER 01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
1523 ± 10		⁵ EDWARDS 00A	CLE2	$\tau^- \rightarrow \omega\pi^- \nu_\tau$
1463 ± 25		⁶ CLEGG 94	RVUE	
1250		⁷ ASTON 80C	OMEG	$20-70 \gamma p \rightarrow \omega\pi^0 p$
1290 ± 40		⁷ BARBER 80C	SPEC	$3-5 \gamma p \rightarrow \omega\pi^0 p$

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 IDTECNCOMMENT

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

1435 ± 40	ABELE 01B	CBAR	$0.0 \bar{p}n \rightarrow 2\pi^- 2\pi^0\pi^+$
1350 ± 50	ACHASOV 97	RVUE	$e^+e^- \rightarrow 2(\pi^+\pi^-)$
1449 ± 4	⁸ ARMSTRONG 89E	OMEG	$300 pp \rightarrow p\rho 2(\pi^+\pi^-)$

⁸ Not clear whether this observation has $l=1$ or 0.

$\pi\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1446 ± 7 ± 28	5.4M	^{9,10} FUJIKAWA	08 BELL	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
1328 ± 15		¹¹ SCHAEEL	05C ALEP	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
1406 ± 15	87k	^{9,12} ANDERSON	00A CLE2	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
~ 1368		¹³ ABELE	99C CBAR	$0.0 \bar{p}d \rightarrow \pi^+ \pi^- \pi^- p$
1348 ± 33		BERTIN	98 OBLX	$0.05-0.405 \bar{n}p \rightarrow 2\pi^+ \pi^-$
1411 ± 14		¹⁴ ABELE	97 CBAR	$\bar{p}n \rightarrow \pi^- \pi^0 \pi^0$
1370 ⁺⁹⁰ -70		ACHASOV	97 RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$
1359 ± 40		¹² BERTIN	97C OBLX	$0.0 \bar{p}p \rightarrow \pi^+ \pi^- \pi^0$
1282 ± 37		BERTIN	97D OBLX	$0.05 \bar{p}p \rightarrow 2\pi^+ 2\pi^-$
1424 ± 25		BISELLO	89 DM2	$e^+ e^- \rightarrow \pi^+ \pi^-$
1265.5 ± 75.3		DUBNICKA	89 RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$
1292 ± 17		¹⁵ KURDADZE	83 OLYA	$0.64-1.4 e^+ e^- \rightarrow \pi^+ \pi^-$

⁹ From the GOUNARIS 68 parametrization of the pion form factor.

¹⁰ $|F_\pi(0)|^2$ fixed to 1.

¹¹ From the combined fit of the τ^- data from ANDERSON 00A and SCHAEEL 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.

¹² $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively.

¹³ $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively.

¹⁴ T-matrix pole.

¹⁵ Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively.

$K\bar{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1422.8 ± 6.5	27k	¹⁶ ABELE	99D CBAR	±	$0.0 \bar{p}p \rightarrow K^+ K^- \pi^0$

¹⁶ K-matrix pole. Isospin not determined, could be $\omega(1420)$.

$K\bar{K}^*(892) + c.c.$ 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	$10.6 e^+ e^- \rightarrow K\bar{K}^*(892)\gamma$

$\rho(1450)$ WIDTH

VALUE (MeV)	DOCUMENT ID
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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.

$\eta\rho^0$ MODE

VALUE (MeV)		DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
226 ± 44		¹⁷ AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
211 ± 31		¹⁸ 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	$8.95 \pi^- p \rightarrow \eta\pi^+\pi^- n$

¹⁷ Using the data of AKHMETSHIN 01B on $e^+e^- \rightarrow \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \rightarrow \eta\pi^+\pi^-$.

¹⁸ 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. ● ● ●				
429 ± 42 ± 10	2382	¹⁹ AKHMETSHIN 03B	CMD2	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
547 ± 86 ⁺⁴⁶ / ₋₄₅	341	²⁰ ALEXANDER 01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
400 ± 35		²¹ EDWARDS 00A	CLE2	$\tau^- \rightarrow \omega\pi^- \nu_\tau$
311 ± 62		²² CLEGG 94	RVUE	
300		²³ ASTON 80C	OMEG	20–70 $\gamma p \rightarrow \omega\pi^0 p$
320 ± 100		²³ BARBER 80C	SPEC	3–5 $\gamma p \rightarrow \omega\pi^0 p$

¹⁹ 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.

²⁰ Using Breit-Wigner parameterization of the $\rho(1450)$ and assuming the $\omega\pi^-$ mass dependence for the total width.

²¹ Mass-independent width parameterization. $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV respectively.

²² Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

²³ 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 $0.0 \bar{p}n \rightarrow 2\pi^- 2\pi^0 \pi^+$

 $\pi\pi$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
434 ± 16 ± 60	5.4M	^{24,25} FUJIKAWA 08	BELL	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
468 ± 41		²⁶ SCHAEEL 05C	ALEP	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
455 ± 41	87k	^{24,27} ANDERSON 00A	CLE2	$\tau^- \rightarrow \pi^-\pi^0\nu_\tau$
~ 374		²⁸ ABELE 99C	CBAR	$0.0 \bar{p}d \rightarrow \pi^+\pi^-\pi^-p$
275 ± 10		BERTIN 98	OBLX	$0.05-0.405 \bar{n}p \rightarrow \pi^+\pi^+\pi^-$
343 ± 20		²⁹ ABELE 97	CBAR	$\bar{p}n \rightarrow \pi^-\pi^0\pi^0$
310 ± 40		²⁷ BERTIN 97C	OBLX	$0.0 \bar{p}p \rightarrow \pi^+\pi^-\pi^0$
236 ± 36		BERTIN 97D	OBLX	$0.05 \bar{p}p \rightarrow 2\pi^+ 2\pi^-$
269 ± 31		BISELLO 89	DM2	$e^+e^- \rightarrow \pi^+\pi^-$
391 ± 70		DUBNICKA 89	RVUE	$e^+e^- \rightarrow \pi^+\pi^-$
218 ± 46		³⁰ KURDADZE 83	OLYA	$0.64-1.4 e^+e^- \rightarrow \pi^+\pi^-$

- 24 From the GOUNARIS 68 parametrization of the pion form factor.
 25 $|F_\pi(0)|^2$ fixed to 1.
 26 From the combined fit of the τ^- data from ANDERSON 00A and SCHAEEL 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.
 27 $\rho(1700)$ mass and width fixed at 1700 MeV and 235 MeV, respectively.
 28 $\rho(1700)$ mass and width fixed at 1780 MeV and 275 MeV respectively.
 29 T-matrix pole.
 30 Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively.

$K\bar{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

146.5 ± 10.5	27k	³¹ ABELE	99D	CBAR \pm	$0.0 \bar{p}p \rightarrow K^+ K^- \pi^0$
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³¹ K-matrix pole. Isospin not determined, could be $\omega(1420)$.

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$418 \pm 25 \pm 4$	AUBERT	08S	BABR $10.6 e^+ e^- \rightarrow K\bar{K}^*(892)\gamma$
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$\rho(1450)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $\pi\pi$	seen
Γ_2 4π	seen
Γ_3 $\omega\pi$	
Γ_4 $a_1(1260)\pi$	
Γ_5 $h_1(1170)\pi$	
Γ_6 $\pi(1300)\pi$	
Γ_7 $\rho\rho$	
Γ_8 $\rho(\pi\pi)S\text{-wave}$	
Γ_9 e^+e^-	seen
Γ_{10} $\eta\rho$	possibly seen
Γ_{11} $a_2(1320)\pi$	not seen
Γ_{12} $K\bar{K}$	not seen
Γ_{13} $K\bar{K}^*(892) + \text{c.c.}$	possibly seen
Γ_{14} $\eta\gamma$	possibly seen

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

$\Gamma(\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$	$\Gamma_1\Gamma_9/\Gamma$
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VALUE (keV)	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.12	³² DIEKMAN	88	RVUE $e^+e^- \rightarrow \pi^+\pi^-$
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$0.027^{+0.015}_{-0.010}$	³³ KURDADZE	83	OLYA $0.64\text{--}1.4 e^+e^- \rightarrow \pi^+\pi^-$
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$\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$				$\Gamma_{10}\Gamma_9/\Gamma$
<u>VALUE (eV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
74 ± 20	³⁴ AKHMETSHIN 00D	CMD2	$e^+e^- \rightarrow \eta\pi^+\pi^-$	
91 ± 19	ANTONELLI 88	DM2	$e^+e^- \rightarrow \eta\pi^+\pi^-$	

$\Gamma(\eta\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$				$\Gamma_{14}\Gamma_9/\Gamma$
<u>VALUE (eV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
<16.4	³⁵ AKHMETSHIN 05	CMD2	$0.60-1.38 e^+e^- \rightarrow \eta\gamma$	
$2.2 \pm 0.5 \pm 0.3$	³⁶ AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$	

$\Gamma(K\bar{K}^*(892) + \text{c.c.}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$				$\Gamma_{13}\Gamma_9/\Gamma$
<u>VALUE (eV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$127 \pm 15 \pm 6$	AUBERT 08S	BABR	$10.6 e^+e^- \rightarrow K\bar{K}^*(892)\gamma$	
³² Using total width = 235 MeV.				
³³ Using for $\rho(1700)$ mass and width 1600 ± 20 and 300 ± 10 MeV respectively.				
³⁴ Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the $\rho(1450)$ and $\rho(1700)$ mesons assumed.				
³⁵ From 2γ decay mode of η using 1465 MeV and 310 MeV for the $\rho(1450)$ mass and width. Recalculated by us.				
³⁶ Using the data of AKHMETSHIN 01B on $e^+e^- \rightarrow \eta\gamma$, AKHMETSHIN 00D and ANTONELLI 88 on $e^+e^- \rightarrow \eta\pi^+\pi^-$. Recalculated by us using width of 226 MeV.				

$\rho(1450)$ BRANCHING RATIOS

$\Gamma(\pi\pi)/\Gamma(4\pi)$				Γ_1/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.37 ± 0.10	^{37,38} ABELE	01B	CBAR $0.0 \bar{p}n \rightarrow 5\pi$	

$\Gamma(\omega\pi)/\Gamma_{\text{total}}$				Γ_3/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
~ 0.21	CLEGG 94	RVUE		

$\Gamma(\pi\pi)/\Gamma(\omega\pi)$				Γ_1/Γ_3
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
~ 0.32	CLEGG 94	RVUE		

$\Gamma(\omega\pi)/\Gamma(4\pi)$				Γ_3/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● 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_4/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.27±0.08	³⁷ ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$
$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$				Γ_5/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08±0.04	³⁷ ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$
$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$				Γ_6/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.37±0.13	³⁷ ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$
$\Gamma(\rho\rho)/\Gamma(4\pi)$				Γ_7/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.11±0.05	³⁷ ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$
$\Gamma(\rho(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$				Γ_8/Γ_2
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.17±0.09	³⁷ ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$
$\Gamma(\eta\rho)/\Gamma_{\text{total}}$				Γ_{10}/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.04	DONNACHIE	87B	RVUE	
$\Gamma(\eta\rho)/\Gamma(\omega\pi)$				Γ_{10}/Γ_3
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 0.24	³⁹ DONNACHIE	91	RVUE	
>2	FUKUI	91	SPEC	8.95 $\pi^- p \rightarrow \omega\pi^0 n$
$\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}}$				Γ_{11}/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	AMELIN	00	VES	³⁷ $\pi^- p \rightarrow \eta\pi^+\pi^- n$
$\Gamma(K\bar{K})/\Gamma(\omega\pi)$				Γ_{12}/Γ_3
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.08	³⁹ DONNACHIE	91	RVUE	

$\Gamma(K\bar{K}^*(892)+c.c.)/\Gamma_{total}$

Γ_{13}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
• • •	We do not use the following data for averages, fits, limits, etc. • • •		
possibly seen	COAN	04	CLEO $\tau^- \rightarrow K^- \pi^- K^+ \nu_\tau$
³⁷	$\omega\pi$ not included.		
³⁸	Using ABELE 97.		
³⁹	Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.		

$\rho(1450)$ REFERENCES

AUBERT	08S	PR D77 092002	B. Aubert <i>et al.</i>	(BABAR Collab.)
FUJIKAWA	08	PR D78 072006	M. Fujikawa <i>et al.</i>	(BELLE Collab.)
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ALOISIO	05	PL B606 12	A. Aloisio <i>et al.</i>	(KLOE Collab.)
SCHAEEL	05C	PRPL 421 191	S. Schaeel <i>et al.</i>	(ALEPH Collab.)
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
COAN	04	PRL 92 232001	T.E. Coan <i>et al.</i>	(CLEO Collab.)
AKHMETSHIN	03B	PL B562 173	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ABELE	01B	EPJ C21 261	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ALEXANDER	01B	PR D64 092001	J.P. Alexander <i>et al.</i>	(CLEO Collab.)
AKHMETSHIN	00D	PL B489 125	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AMELIN	00	NP A668 83	D. Amelin <i>et al.</i>	(VES Collab.)
ANDERSON	00A	PR D61 112002	S. Anderson <i>et al.</i>	(CLEO Collab.)
EDWARDS	00A	PR D61 072003	K.W. Edwards <i>et al.</i>	(CLEO Collab.)
ABELE	99C	PL B450 275	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
ABELE	99D	PL B468 178	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
BERTIN	98	PR D57 55	A. Bertin <i>et al.</i>	(OBELIX Collab.)
ABELE	97	PL B391 191	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
ACHASOV	97	PR D55 2663	N.N. Achasov <i>et al.</i>	(NOVM)
BARATE	97M	ZPHY C76 15	R. Barate <i>et al.</i>	(ALEPH Collab.)
BERTIN	97C	PL B408 476	A. Bertin <i>et al.</i>	(OBELIX Collab.)
BERTIN	97D	PL B414 220	A. Bertin <i>et al.</i>	(OBELIX Collab.)
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 <i>et al.</i>	(NOVO)
DONNACHIE	91	ZPHY C51 689	A. Donnachie, A.B. Clegg	(MCHS, LANC)
FUKUI	91	PL B257 241	S. Fukui <i>et al.</i>	(SUGI, NAGO, KEK, KYOT+)
ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)
BISELLO	89	PL B220 321	D. Bisello <i>et al.</i>	(DM2 Collab.)
DUBNICKA	89	JPG 15 1349	S. Dubnicka <i>et al.</i>	(JINR, SLOV)
ANTONELLI	88	PL B212 133	A. Antonelli <i>et al.</i>	(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 <i>et al.</i>	(SUGI, NAGO, KEK, KYOT+)
ALBRECHT	87L	PL B185 223	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
DONNACHIE	87B	ZPHY C34 257	A. Donnachie, A.B. Clegg	(MCHS, LANC)
DOLINSKY	86	PL B174 453	S.I. Dolinsky <i>et al.</i>	(NOVO)
BARKOV	85	NP B256 365	L.M. Barkov <i>et al.</i>	(NOVO)
KURDADZE	83	JETPL 37 733	L.M. Kurdadze <i>et al.</i>	(NOVO)
ASTON	80C	PL 92B 211	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)
BARBER	80C	ZPHY C4 169	D.P. Barber <i>et al.</i>	(DARE, LANC, SHEF)
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai	