

# ρ(1450)

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

See the mini-review under the ρ(1700).

## ρ(1450) MASS

VALUE (MeV)	DOCUMENT ID
<b>1465 ± 25 OUR ESTIMATE</b>	This is only an educated guess; the error given is larger than the error on the average of the published values.
<b>1452 ± 8 OUR AVERAGE</b>	Includes data from the 2 datablocks that follow this one.

### ηρ<sup>0</sup> MODE

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.			

1470 ± 20	ANTONELLI	88	DM2	e <sup>+</sup> e <sup>-</sup> → ηπ <sup>+</sup> π <sup>-</sup>
1446 ± 10	FUKUI	88	SPEC	8.95 π <sup>-</sup> p → ηπ <sup>+</sup> π <sup>-</sup> n
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1497 ± 14	<sup>13</sup> AKHMETSHIN	01B	CMD2	e <sup>+</sup> e <sup>-</sup> → ηγ
1421 ± 15	<sup>1</sup> AKHMETSHIN	00D	CMD2	e <sup>+</sup> e <sup>-</sup> → ηπ <sup>+</sup> π <sup>-</sup>

<sup>1</sup> Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the ρ(1450) and ρ(1700) mesons assumed.

### ωπ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				

1463 ± 25		<sup>14</sup> CLEGG	94	RVUE
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
1349 ± 25 <sup>+10</sup> / <sub>-5</sub>	341	<sup>2</sup> ALEXANDER	01B	CLE2 B → D(*)ωπ <sup>-</sup>
1523 ± 10		<sup>3</sup> EDWARDS	00A	CLE2 τ <sup>-</sup> → ωπ <sup>-</sup> ν <sub>τ</sub>
1250		<sup>4</sup> ASTON	80C	OMEG 20-70 γp → ωπ <sup>0</sup> p
1290 ± 40		<sup>4</sup> BARBER	80C	SPEC 3-5 γp → ωπ <sup>0</sup> p

<sup>2</sup> Using Breit-Wigner parameterization of the ρ(1450) and assuming the ωπ<sup>-</sup> mass dependence for the total width.

<sup>3</sup> Mass-independent width parameterization. ρ(1700) mass and width fixed at 1700 MeV and 235 MeV respectively.

<sup>4</sup> Not separated from b<sub>1</sub>(1235), not pure J<sup>P</sup> = 1<sup>-</sup> 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 p̄n → 2π <sup>-</sup> 2π <sup>0</sup> π <sup>+</sup>
1350 ± 50	ACHASOV	97	RVUE	e <sup>+</sup> e <sup>-</sup> → 2(π <sup>+</sup> π <sup>-</sup> )
1449 ± 4	<sup>5</sup> ARMSTRONG	89E	OMEG	300 pp → pp2(π <sup>+</sup> π <sup>-</sup> )

<sup>5</sup> 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. ● ● ●				
$1406 \pm 15$	87k	<sup>6,15</sup> ANDERSON	00A CLE2	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
$\sim 1368$		<sup>7</sup> ABELE	99C CBAR	$0.0 \bar{p}d \rightarrow \pi^+ \pi^- \pi^- p$
$1348 \pm 33$		BERTIN	98 OBLX	$0.05-0.405 \bar{n}p \rightarrow \pi^+ \pi^+ \pi^-$
$1411 \pm 14$		<sup>8</sup> ABELE	97 CBAR	$\bar{p}n \rightarrow \pi^- \pi^0 \pi^0$
$1370^{+90}_{-70}$		ACHASOV	97 RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$
$1380 \pm 24$		<sup>16</sup> BARATE	97M ALEP	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
$1359 \pm 40$		<sup>15</sup> BERTIN	97C OBLX	$0.0 \bar{p}p \rightarrow \pi^+ \pi^- \pi^0$
$1282 \pm 37$		BERTIN	97D OBLX	$0.05 \bar{p}p \rightarrow 2\pi^+ 2\pi^-$
$1424 \pm 25$		BISELLO	89 DM2	$e^+ e^- \rightarrow \pi^+ \pi^-$
$1292 \pm 17$		<sup>9</sup> KURDADZE	83 OLYA	$0.64-1.4 e^+ e^- \rightarrow \pi^+ \pi^-$

<sup>6</sup> From the GOUNARIS 68 parametrization of the pion form factor.

<sup>7</sup>  $\rho(1700)$  mass and width fixed at 1780 MeV and 275 MeV respectively.

<sup>8</sup> T-matrix pole.

<sup>9</sup> Using for  $\rho(1700)$  mass and width  $1600 \pm 20$  and  $300 \pm 10$  MeV respectively.

## $\phi\pi$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$1480 \pm 40$	<sup>10,11</sup> BITYUKOV	87 SPEC	0	$32.5 \pi^- p \rightarrow \phi \pi^0 n$

<sup>10</sup> DONNACHIE 91 suggests this is a different particle.

<sup>11</sup> Not seen by ABELE 97H.

## $K\bar{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
$1422.8 \pm 6.5$	27k	<sup>12</sup> ABELE	99D CBAR	$\pm$	$0.0 \bar{p}p \rightarrow K^+ K^- \pi^0$

<sup>12</sup> K-matrix pole. Isospin not determined, could be  $\omega(1420)$ .

## MIXED MODES

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$1265.5 \pm 75.3$	DUBNICKA	89 RVUE	$e^+ e^- \rightarrow \pi^+ \pi^-$

<sup>13</sup> Using the data of AKHMETSHIN 01B on  $e^+ e^- \rightarrow \eta\gamma$ , AKHMETSHIN 00D and ANTONELLI 88 on  $e^+ e^- \rightarrow \eta\pi^+\pi^-$ .

<sup>14</sup> Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

<sup>15</sup>  $\rho(1700)$  mass and width fixed at 1700 MeV and 235 MeV, respectively.

<sup>16</sup> Fixing  $\rho(1450)$  width to 310 MeV and  $\rho(1700)$  mass and width to 1700 MeV and 235 MeV respectively.

## $\rho(1450)$ WIDTH

VALUE (MeV) DOCUMENT ID  
**310±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

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
226±44	27 AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$
211±31	17 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	$8.95 \pi^- p \rightarrow \eta\pi^+\pi^- n$

<sup>17</sup> 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  
 The data in this block is included in the average printed for a previous datablock.

311± 62	28 CLEGG	94 RVUE	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
547± 86 <sup>+46</sup> <sub>-45</sub>	341 18 ALEXANDER 01B	CLE2	$B \rightarrow D^{(*)}\omega\pi^-$
400± 35	19 EDWARDS 00A	CLE2	$\tau^- \rightarrow \omega\pi^-\nu_\tau$
300	20 ASTON 80C	OMEG	$20-70 \gamma p \rightarrow \omega\pi^0 p$
320±100	20 BARBER 80C	SPEC	$3-5 \gamma p \rightarrow \omega\pi^0 p$

<sup>18</sup> Using Breit-Wigner parameterization of the  $\rho(1450)$  and assuming the  $\omega\pi^-$  mass dependence for the total width.

<sup>19</sup> Mass-independent width parameterization.  $\rho(1700)$  mass and width fixed at 1700 MeV and 235 MeV respectively.

<sup>20</sup> Not separated from  $b_1(1235)$ , not pure  $J^P = 1^-$  effect.

### 4 $\pi$ MODE

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● 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

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
455±41	87k <sup>21,29</sup>	ANDERSON 00A	CLE2	$\tau^- \rightarrow \pi^- \pi^0 \nu_\tau$
~ 374	<sup>22</sup>	ABELE 99C	CBAR	$0.0 \bar{p}d \rightarrow \pi^+ \pi^- \pi^- p$
275±10		BERTIN 98	OBLX	$0.05-0.405 \bar{p}p \rightarrow \pi^+ \pi^+ \pi^-$
343±20		<sup>30</sup> ABELE 97	CBAR	$\bar{p}n \rightarrow \pi^- \pi^0 \pi^0$
310±40		<sup>29</sup> 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	$e^+e^- \rightarrow \pi^+ \pi^-$
218±46		<sup>23</sup> KURDADZE 83	OLYA	$0.64-1.4 e^+e^- \rightarrow \pi^+ \pi^-$

<sup>21</sup> From the GOUNARIS 68 parametrization of the pion form factor.

<sup>22</sup>  $\rho(1700)$  mass and width fixed at 1780 MeV and 275 MeV respectively.

<sup>23</sup> Using for  $\rho(1700)$  mass and width  $1600 \pm 20$  and  $300 \pm 10$  MeV respectively.

### $\phi\pi$ MODE

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT	
$130 \pm 60$	24, <sup>25</sup> BITYUKOV	87	SPEC	0	$32.5 \pi^- p \rightarrow \phi \pi^0 n$

<sup>24</sup> DONNACHIE 91 suggests this is a different particle.

<sup>25</sup> Not seen by ABELE 97H.

### $K\bar{K}$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
$146.5 \pm 10.5$	27k	<sup>26</sup> ABELE	99D	CBAR	$\pm$	$0.0 \bar{p} p \rightarrow K^+ K^- \pi^0$

<sup>26</sup> K-matrix pole. Isospin not determined, could be  $\omega(1420)$ .

### MIXED MODES

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$391 \pm 70$	DUBNICKA	89	RVUE $e^+ e^- \rightarrow \pi^+ \pi^-$

<sup>27</sup> Using the data of AKHMETSHIN 01B on  $e^+ e^- \rightarrow \eta\gamma$ , AKHMETSHIN 00D and ANTONELLI 88 on  $e^+ e^- \rightarrow \eta\pi^+\pi^-$ .

<sup>28</sup> Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.

<sup>29</sup>  $\rho(1700)$  mass and width fixed at 1700 MeV and 235 MeV, respectively.

<sup>30</sup> T-matrix pole.

## $\rho(1450)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $\pi\pi$	seen	
$\Gamma_2$ $4\pi$	seen	
$\Gamma_3$ $\omega\pi$	$<2.0\%$	95%
$\Gamma_4$ $a_1(1260)\pi$		
$\Gamma_5$ $h_1(1170)\pi$		
$\Gamma_6$ $\pi(1300)\pi$		
$\Gamma_7$ $\rho\rho$		
$\Gamma_8$ $\rho(\pi\pi)$ S-wave		
$\Gamma_9$ $e^+ e^-$	seen	
$\Gamma_{10}$ $\eta\rho$	$<4\%$	
$\Gamma_{11}$ $a_2(1320)\pi$	not seen	
$\Gamma_{12}$ $\phi\pi$	$<1\%$	
$\Gamma_{13}$ $K\bar{K}$	$<1.6 \times 10^{-3}$	95%
$\Gamma_{14}$ $\eta\gamma$	possibly seen	

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

#### $\Gamma(\pi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_1\Gamma_9/\Gamma$

<u>VALUE (keV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.12	<sup>31</sup> DIEKMAN	88	RVUE $e^+e^- \rightarrow \pi^+\pi^-$
$0.027^{+0.015}_{-0.010}$	<sup>32</sup> KURDADZE	83	OLYA $0.64\text{--}1.4 e^+e^- \rightarrow \pi^+\pi^-$

#### $\Gamma(\eta\rho) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{10}\Gamma_9/\Gamma$

<u>VALUE (eV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>91±19</b>	ANTONELLI	88	DM2 $e^+e^- \rightarrow \eta\pi^+\pi^-$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
74±20	<sup>33</sup> AKHMETSHIN 00D	CMD2	$e^+e^- \rightarrow \eta\pi^+\pi^-$

#### $\Gamma(\phi\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{12}\Gamma_9/\Gamma$

<u>VALUE (eV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<70	90	<sup>34</sup> AULCHENKO	87B	ND $e^+e^- \rightarrow K_S^0 K_L^0 \pi^0$

#### $\Gamma(\eta\gamma) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{14}\Gamma_9/\Gamma$

<u>VALUE (units 10<sup>-9</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
10.0±2.2±1.5	<sup>35</sup> AKHMETSHIN 01B	CMD2	$e^+e^- \rightarrow \eta\gamma$

<sup>31</sup> Using total width = 235 MeV.

<sup>32</sup> Using for  $\rho(1700)$  mass and width  $1600 \pm 20$  and  $300 \pm 10$  MeV respectively.

<sup>33</sup> Using the data of ANTONELLI 88, DOLINSKY 91, and AKHMETSHIN 00D. The energy-independent width of the  $\rho(1450)$  and  $\rho(1700)$  mesons assumed.

<sup>34</sup> Using mass  $1480 \pm 40$  MeV and total width  $130 \pm 60$  MeV of BITYUKOV 87.

<sup>35</sup> Using the data of AKHMETSHIN 01B on  $e^+e^- \rightarrow \eta\gamma$ , AKHMETSHIN 00D and ANTONELLI 88 on  $e^+e^- \rightarrow \eta\pi^+\pi^-$ .

### $\rho(1450)$ BRANCHING RATIOS

#### $\Gamma(\eta\rho)/\Gamma_{\text{total}} \quad \Gamma_{10}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.04	DONNACHIE	87B	RVUE

#### $\Gamma(a_2(1320)\pi)/\Gamma_{\text{total}} \quad \Gamma_{11}/\Gamma$

<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 $37 \pi^- p \rightarrow \eta\pi^+\pi^- n$

#### $\Gamma(\phi\pi)/\Gamma(\omega\pi) \quad \Gamma_{12}/\Gamma_3$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
>0.5	95	BITYUKOV	87	SPEC	0 $32.5 \pi^- p \rightarrow \phi\pi^0 n$

$\Gamma(\omega\pi)/\Gamma(4\pi)$					$\Gamma_3/\Gamma_2$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
<0.14	CLEGG	88	RVUE		
$\Gamma(a_1(1260)\pi)/\Gamma(4\pi)$					$\Gamma_4/\Gamma_2$
<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	<sup>36</sup> ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$	
$\Gamma(h_1(1170)\pi)/\Gamma(4\pi)$					$\Gamma_5/\Gamma_2$
<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	<sup>36</sup> ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$	
$\Gamma(\pi(1300)\pi)/\Gamma(4\pi)$					$\Gamma_6/\Gamma_2$
<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	<sup>36</sup> ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$	
$\Gamma(\rho\rho)/\Gamma(4\pi)$					$\Gamma_7/\Gamma_2$
<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	<sup>36</sup> ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$	
$\Gamma(\rho(\pi\pi)_{S\text{-wave}})/\Gamma(4\pi)$					$\Gamma_8/\Gamma_2$
<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	<sup>36</sup> ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$	
$\Gamma(\pi\pi)/\Gamma(4\pi)$					$\Gamma_1/\Gamma_2$
<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	<sup>36,37</sup> ABELE	01B	CBAR	0.0 $\bar{p}n \rightarrow 5\pi$	
$\Gamma(\eta\rho)/\Gamma(\omega\pi)$					$\Gamma_{10}/\Gamma_3$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
~ 0.24	<sup>38</sup> DONNACHIE	91	RVUE		
••• We do not use the following data for averages, fits, limits, etc. •••					
>2	FUKUI	91	SPEC	8.95 $\pi^- p \rightarrow \omega\pi^0 n$	
$\Gamma(\omega\pi)/\Gamma_{\text{total}}$					$\Gamma_3/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
~ 0.21	CLEGG	94	RVUE		
$\Gamma(\pi\pi)/\Gamma(\omega\pi)$					$\Gamma_1/\Gamma_3$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
~ 0.32	CLEGG	94	RVUE		

$\Gamma(\phi\pi)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	$\Gamma_{12}/\Gamma$
VALUE				
<0.01	38 DONNACHIE	91	RVUE	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	ABELE	97H CBAR	$\bar{p}p \rightarrow K_L^0 K_S^0 \pi^0 \pi^0$	

$\Gamma(K\bar{K})/\Gamma(\omega\pi)$	DOCUMENT ID	TECN		$\Gamma_{13}/\Gamma_3$
VALUE				
<0.08	38 DONNACHIE	91	RVUE	
<sup>36</sup> $\omega\pi$ not included.				
<sup>37</sup> Using ABELE 97.				
<sup>38</sup> Using data from BISELLO 91B, DOLINSKY 86 and ALBRECHT 87L.				

### $\rho(1450)$ REFERENCES

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.)
ABELE	97H	PL B415 280	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)
DIEKMANN	88	PRPL 159 101	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.)
AULCHENKO	87B	JETPL 45 145	V.M. Aulchenko <i>et al.</i>	(NOVO)
		Translated from ZETFP 45 118.		
BITYUKOV	87	PL B188 383	S.I. Bitjukov <i>et al.</i>	(SERP)
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)
KURDADZE	83	JETPL 37 733	L.M. Kurdadze <i>et al.</i>	(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 <i>et al.</i>	(DARE, LANC, SHEF)
GOUNARIS	68	PRL 21 244	G.J. Gounaris, J.J. Sakurai	

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		Translated from YAF 65 158.		
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		Translated from FECA	29 148.	
ABELE	97H	PL B415 280	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
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CLOSE	97C	PR D56 1584	F.E. Close <i>et al.</i>	(RAL, MCHS)
URHEIM	97	NPBPS 55C 359	J. Urheim	(CLEO Collab.)
ACHASOV	96B	PAN 59 1262	N.N. Achasov, G.N. Shestakov	(NOVM)
		Translated from YAF	59 1319.	
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LANDSBERG	92	SJNP 55 1051	L.G. Landsberg	(SERP)
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BRAU	88	PR D37 2379	J.E. Brau <i>et al.</i>	
ASTON	87	NP B292 693	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
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BARKOV	85	NP B256 365	L.M. Barkov <i>et al.</i>	(NOVO)
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