$\pi_2(1670)$

$$I^G(J^{PC}) = 1^-(2^{-+})$$
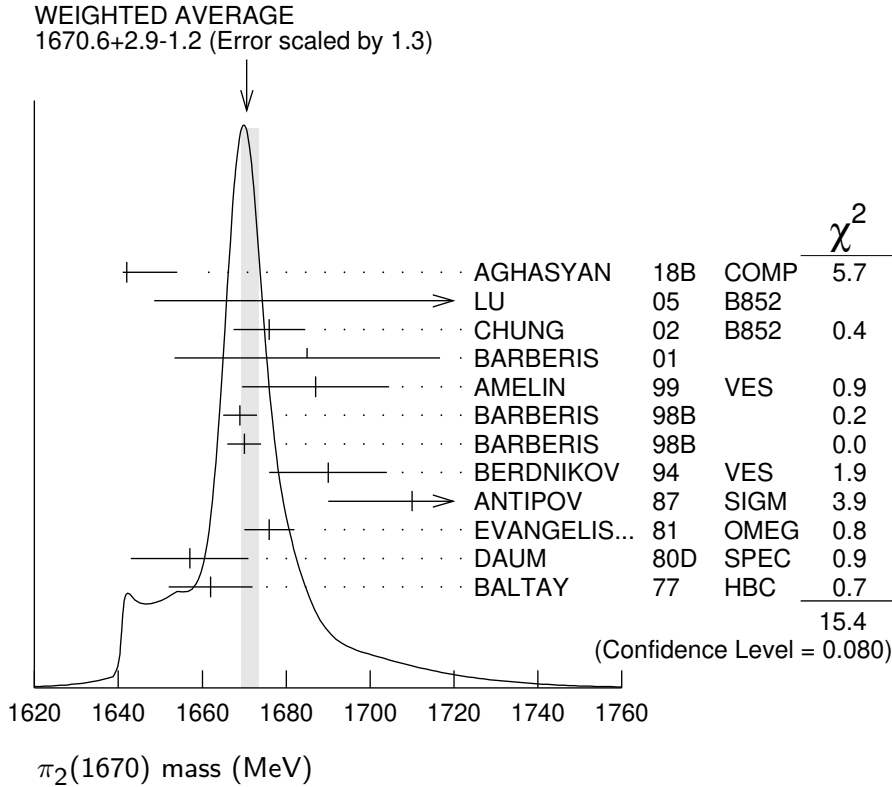
$\pi_2(1670)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$1670.6{}^{+\,2.9}_{-\,1.2}$ **OUR AVERAGE**						Error includes scale factor of 1.3. See the ideogram below.
$1642\ {}^{+12}_{-\ 1}$	46M	[1] AGHASYAN	18B	COMP		$190\ \pi^- p \to$ $\pi^-\pi^+\pi^- p$
$1749\ \pm 10\ \pm 100$	145k	LU	05	B852		$18\ \pi^- p \to$ $\omega\pi^-\pi^0 p$
$1676\ \pm 3\ \pm 8$		[2] CHUNG	02	B852		$18.3\ \pi^- p \to$ $\pi^+\pi^-\pi^- p$
$1685\ \pm 10\ \pm 30$		BARBERIS	01			$450\ pp \to$ $p_f 3\pi^0 p_s$
$1687\ \pm 9\ \pm 15$		AMELIN	99	VES		$37\ \pi^- A \to$ $\omega\pi^-\pi^0 A^*$
$1669\ \pm 4$		BARBERIS	98B			$450\ pp \to\ p_f \rho\pi p_s$
$1670\ \pm 4$		BARBERIS	98B			$450\ pp \to$ $p_f f_2(1270)\pi p_s$
$1690\ \pm 14$		[3] BERDNIKOV	94	VES		$37\ \pi^- A \to$ $K^+ K^-\pi^- A$
$1710\ \pm 20$	700	ANTIPOV	87	SIGM	–	$50\ \pi^- Cu \to$ $\mu^+\mu^-\pi^- Cu$
$1676\ \pm 6$		[3] EVANGELIS...	81	OMEG	–	$12\ \pi^- p \to\ 3\pi p$
$1657\ \pm 14$		[3,4] DAUM	80D	SPEC	–	$63–94\ \pi p \to\ 3\pi X$
$1662\ \pm 10$	2000	[3] BALTAY	77	HBC	+	$15\ \pi^+ p \to\ p 3\pi$

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$1658\ \pm 3\ {}^{+\,24}_{-\ 8}$	420k	[5] ALEKSEEV	10	COMP		$190\ \pi^- Pb \to$ $\pi^-\pi^-\pi^+ Pb'$
$1730\ \pm 20$		[6] AMELIN	95B	VES		$36\ \pi^- A \to$ $\pi^+\pi^-\pi^- A$
$1742\ \pm 31\ \pm 49$		ANTREASYAN	90	CBAL		$e^+ e^- \to$ $e^+ e^- \pi^0\pi^0\pi^0$
$1624\ \pm 21$		[2] BELLINI	85	SPEC		$40\ \pi^- A \to$ $\pi^-\pi^+\pi^- A$
$1622\ \pm 35$		[7] BELLINI	85	SPEC		$40\ \pi^- A \to$ $\pi^-\pi^+\pi^- A$
$1693\ \pm 28$		[8] BELLINI	85	SPEC		$40\ \pi^- A \to$ $\pi^-\pi^+\pi^- A$
$1710\ \pm 20$		[9] DAUM	81B	SPEC	–	$63,94\ \pi^- p$
$1660\ \pm 10$		[3] ASCOLI	73	HBC	–	$5–25\ \pi^- p \to\ p\pi_2$

[1] Statistical error negligible.

[2] From $f_2(1270)\pi$ decay.

[3] From a fit to $J^P = 2^-$ S-wave $f_2(1270)\pi$ partial wave.

[4] Clear phase rotation seen in 2^-S, 2^-P, 2^-D waves. We quote central value and spread of single-resonance fits to three channels.

[5] Superseded by AGHASYAN 2018B.

[6] J^{PC} ambiguous.

[7] From $\rho\pi$ decay.

[8] From $\sigma\pi$ decay.

[9] From a two-resonance fit to four 2^-0^+ waves. This should not be averaged with all the single resonance fits.

WEIGHTED AVERAGE
1670.6+2.9-1.2 (Error scaled by 1.3)

			χ^2
AGHASYAN	18B	COMP	5.7
LU	05	B852	
CHUNG	02	B852	0.4
BARBERIS	01		
AMELIN	99	VES	0.9
BARBERIS	98B		0.2
BARBERIS	98B		0.0
BERDNIKOV	94	VES	1.9
ANTIPOV	87	SIGM	3.9
EVANGELIS...	81	OMEG	0.8
DAUM	80D	SPEC	0.9
BALTAY	77	HBC	0.7
			15.4

(Confidence Level = 0.080)

1620 1640 1660 1680 1700 1720 1740 1760

$\pi_2(1670)$ mass (MeV)

$\pi_2(1670)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$258^{+\ 8}_{-\ 9}$ **OUR AVERAGE**						Error includes scale factor of 1.2.
$311^{+\ 12}_{-\ 23}$	46M	[10] AGHASYAN	18B	COMP		$190\ \pi^- p \to$ $\pi^- \pi^+ \pi^- p$
$408\pm\ 60\pm250$	145k	LU	05	B852		$18\ \pi^- p \to\ \omega\pi^-\pi^0 p$
$254\pm\ \ 3\pm\ 31$		[11] CHUNG	02	B852		$18.3\ \pi^- p \to$ $\pi^+ \pi^- \pi^- p$
$265\pm\ 30\pm\ 40$		BARBERIS	01			$450\ pp \to\ p_f 3\pi^0 p_s$
$168\pm\ 43\pm\ 53$		AMELIN	99	VES		$37\ \pi^- A \to$ $\omega\pi^-\pi^0 A^*$
$268\pm\ 15$		BARBERIS	98B			$450\ pp \to\ p_f \rho\pi p_s$
$256\pm\ 15$		BARBERIS	98B			$450\ pp \to$ $p_f f_2(1270)\pi p_s$
$190\pm\ 50$		[12] BERDNIKOV	94	VES		$37\ \pi^- A \to$ $K^+ K^- \pi^- A$
$170\pm\ 80$	700	ANTIPOV	87	SIGM	$-$	$50\ \pi^- Cu \to$ $\mu^+ \mu^- \pi^- Cu$
$260\pm\ 20$		[12] EVANGELIS...	81	OMEG	$-$	$12\ \pi^- p \to\ 3\pi p$
$219\pm\ 20$		[12,13] DAUM	80D	SPEC	$-$	63–$94\ \pi p \to\ 3\pi X$
$285\pm\ 60$	2000	[12] BALTAY	77	HBC	$+$	$15\ \pi^+ p \to\ p\,3\pi$

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

$271\pm 9{}^{+22}_{-24}$	420k	[14] ALEKSEEV	10	COMP	$190\ \pi^- Pb \to$ $\pi^- \pi^- \pi^+ Pb'$
310 ± 20		[15] AMELIN	95B	VES	$36\ \pi^- A \to$ $\pi^+ \pi^- \pi^- A$
$236\pm 49\pm 36$		ANTREASYAN	90	CBAL	$e^+ e^- \to$ $e^+ e^- \pi^0 \pi^0 \pi^0$
304 ± 22		[11] BELLINI	85	SPEC	$40\ \pi^- A \to$ $\pi^- \pi^+ \pi^- A$
404 ± 108		[16] BELLINI	85	SPEC	$40\ \pi^- A \to$ $\pi^- \pi^+ \pi^- A$
330 ± 90		[17] BELLINI	85	SPEC	$40\ \pi^- A \to$ $\pi^- \pi^+ \pi^- A$
312 ± 50		[18] DAUM	81B	SPEC	$-$	$63,94\ \pi^- p$
270 ± 60		[12] ASCOLI	73	HBC	$-$	$5-25\ \pi^- p \to p\pi_2$

[10] Statistical error negligible.

[11] From $f_2(1270)\pi$ decay.

[12] From a fit to $J^P = 2^-$ $f_2(1270)\pi$ partial wave.

[13] Clear phase rotation seen in $2^- S$, $2^- P$, $2^- D$ waves. We quote central value and spread of single-resonance fits to three channels.

[14] Superseded by AGHASYAN 2018B.

[15] J^{PC} ambiguous.

[16] From $\rho\pi$ decay.

[17] From $\sigma\pi$ decay.

[18] From a two-resonance fit to four $2^- 0^+$ waves. This should not be averaged with all the single resonance fits.

$\pi_2(1670)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	3π	$(95.8\pm 1.4)\ \%$	
Γ_2	$\pi^+ \pi^- \pi^0$		
Γ_3	$\pi^0 \pi^0 \pi^0$		
Γ_4	$f_2(1270)\pi$	$(56.3\pm 3.2)\ \%$	
Γ_5	$\rho\pi$	$(31\ \pm 4\ )\ \%$	
Γ_6	$\sigma\pi$	$(10\ \pm 4\ )\ \%$	
Γ_7	$\pi(\pi\pi)_{S\text{-wave}}$	$(\ 8.7\pm 3.4)\ \%$	
Γ_8	$\pi^\pm \pi^+ \pi^-$	$(53\ \pm 4\ )\ \%$	
Γ_9	$K\overline{K}{}^*(892)+$ c.c.	$(\ 4.2\pm 1.4)\ \%$	
Γ_{10}	$\omega\rho$	$(\ 2.7\pm 1.1)\ \%$	
Γ_{11}	$\pi^\pm \gamma$	$(\ 7.0\pm 1.2)\times 10^{-4}$	
Γ_{12}	$\gamma\gamma$	$<\ 2.8\ \times 10^{-7}$	90%
Γ_{13}	$\eta\pi$	$<\ 5\ \%$	
Γ_{14}	$\pi^\pm 2\pi^+ 2\pi^-$	$<\ 5\ \%$	
Γ_{15}	$\rho(1450)\pi$	$<\ 3.6\ \times 10^{-3}$	97.7%
Γ_{16}	$b_1(1235)\pi$	$<\ 1.9\ \times 10^{-3}$	97.7%
Γ_{17}	$f_1(1285)\pi$	possibly seen	
Γ_{18}	$a_2(1320)\pi$	not seen	

CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 6 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 = 1.9$ for 3 degrees of freedom.

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

x_5	-53		
x_7	-29	-59	
x_9	-8	-21	-9
	x_4	x_5	x_7

$\pi_2(1670)$ PARTIAL WIDTHS

$\Gamma\left(\pi^{\pm}\gamma\right)$ Γ_{11}

VALUE (keV)	DOCUMENT ID		TECN	CHG	COMMENT
181±11±27	[19] ADOLPH	14	COMP	−	190 $\pi^- $ Pb $\to$ $\pi^+ \pi^- \pi^-$ Pb′

[19] Primakoff reaction. Assumes incoherent $f_2(1270)\pi$ contribution to 3π final state and uses B($\pi_2(1670) \to f_2\pi$) = 56%.

$\Gamma\left(\gamma\gamma\right)$ Γ_{12}

VALUE (keV)	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.072	90	[20] ACCIARRI	97T	L3		$e^+ e^- \to$ $e^+ e^- \pi^+ \pi^- \pi^0$

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

<0.19	90	[20] ALBRECHT	97B	ARG		$e^+ e^- \to$ $e^+ e^- \pi^+ \pi^- \pi^0$
1.41 ±0.23±0.28		ANTREASYAN	90	CBAL	0	$e^+ e^- \to$ $e^+ e^- \pi^0 \pi^0 \pi^0$
0.8 ±0.3 ±0.12		[21] BEHREND	90C	CELL	0	$e^+ e^- \to$ $e^+ e^- \pi^+ \pi^- \pi^0$
1.3 ±0.3 ±0.2		[22] BEHREND	90C	CELL	0	$e^+ e^- \to$ $e^+ e^- \pi^+ \pi^- \pi^0$

[20] Decaying into $f_2(1270)\pi$ and $\rho\pi$.
[21] Constructive interference between $f_2(1270)\pi, \rho\pi$ and background.
[22] Incoherent Ansatz.

$\pi_2(1670)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma\left(\pi^+\pi^-\pi^0\right) \times \Gamma\left(\gamma\gamma\right)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_{12}/\Gamma$

VALUE (keV)	CL%	DOCUMENT ID	TECN	COMMENT
<0.1	95	[23] SCHEGELSKY 06	RVUE	$\gamma\gamma \to \pi^+ \pi^- \pi^0$

[23] From analysis of L3 data at 183–209 GeV.

$\pi_2(1670)$ BRANCHING RATIOS

$\Gamma(3\pi)/\Gamma_{total}$ $\qquad\qquad\qquad\qquad \Gamma_1/\Gamma = (\Gamma_4+\Gamma_5+\Gamma_7)/\Gamma$

VALUE	DOCUMENT ID
0.958±0.014 OUR FIT	

$\Gamma(\pi^0\pi^0\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$ $\qquad\qquad\qquad\qquad \Gamma_3/\Gamma_2$

VALUE	DOCUMENT ID		COMMENT
0.29±0.03±0.05	BARBERIS	01	450 $pp \to p_f 3\pi^0 p_s$

$\Gamma(\rho\pi)/0.565\Gamma(f_2(1270)\pi)$ $\qquad\qquad\qquad\qquad \Gamma_5/0.565\Gamma_4$
(With $f_2(1270) \to \pi^+\pi^-$.)

VALUE	DOCUMENT ID		TECN	COMMENT
0.97±0.09 OUR AVERAGE	Error includes scale factor of 1.9.			
0.76±0.07±0.10	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
1.01±0.05	BARBERIS	98B		450 $pp \to p_f \pi^+\pi^-\pi^0 p_s$

$\Gamma(\sigma\pi)/\Gamma(f_2(1270)\pi)$ $\qquad\qquad\qquad\qquad \Gamma_6/\Gamma_4$

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.02±0.07	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.24±0.10	[24,25] BAKER	99	SPEC	1.94 $\overline{p}p \to 4\pi^0$

$\frac{1}{2}\Gamma(\rho\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$ $\qquad \frac{1}{2}\Gamma_5/\Gamma_8 = \frac{1}{2}\Gamma_5/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.29±0.04 OUR FIT					
0.29±0.05	[26] DAUM	81B	SPEC		63,94 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.3	BARTSCH	68	HBC	+	8 $\pi^+ p \to 3\pi p$

$0.565\Gamma(f_2(1270)\pi)/\Gamma(\pi^\pm\pi^+\pi^-)$
$\qquad\qquad 0.565\Gamma_4/\Gamma_8 = 0.565\Gamma_4/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$
(With $f_2(1270) \to \pi^+\pi^-$.)

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.604±0.035 OUR FIT					
0.60 ±0.05 OUR AVERAGE	Error includes scale factor of 1.3.				
0.61 ±0.04	[26] DAUM	81B	SPEC		63,94 $\pi^- p$
0.76 $^{+0.24}_{-0.34}$	ARMENISE	69	DBC	+	5.1 $\pi^+ d \to d3\pi$
0.35 ±0.20	BALTAY	68	HBC	+	7–8.5 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.59	BARTSCH	68	HBC	+	8 $\pi^+ p \to 3\pi p$

$0.624\Gamma(\pi(\pi\pi)_{S\text{-wave}})/\Gamma(\pi^\pm\pi^+\pi^-)$
$\qquad\qquad 0.624\Gamma_7/\Gamma_8 = 0.624\Gamma_7/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$
(With $(\pi\pi)_{S\text{-wave}} \to \pi^+\pi^-$.)

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.04 OUR FIT				
0.10±0.05	[26] DAUM	81B	SPEC	63,94 $\pi^- p$

$\Gamma\left(K\overline{K}{}^*(892)+\text{c.c.}\right)/\Gamma\left(f_2(1270)\pi\right)$ Γ_9/Γ_4

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.075±0.025 OUR FIT				
0.075±0.025	[27] ARMSTRONG 82B	OMEG	−	16 $\pi^- p \to K^+ K^- \pi^- p$

$\Gamma\left(\omega\rho\right)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.027±0.004±0.010	[28] AMELIN 99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma\left(\eta\pi\right)/\Gamma\left(\pi^\pm\pi^+\pi^-\right)$ $\Gamma_{13}/\Gamma_8 = \Gamma_{13}/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$
(All η decays.)

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<0.09	BALTAY 68	HBC	+	7–8.5 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.10	CRENNELL 70	HBC	−	6 $\pi^- p \to f_2\pi^- N$

$\Gamma\left(\pi^\pm 2\pi^+ 2\pi^-\right)/\Gamma\left(\pi^\pm\pi^+\pi^-\right)$ $\Gamma_{14}/\Gamma_8 = \Gamma_{14}/(0.565\Gamma_4+\frac{1}{2}\Gamma_5+0.624\Gamma_7)$

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
<0.10	CRENNELL 70	HBC	−	6 $\pi^- p \to f_2\pi^- N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.1	BALTAY 68	HBC	+	7,8.5 $\pi^+ p$

$\Gamma\left(\rho(1450)\pi\right)/\Gamma_{\text{total}}$ Γ_{15}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0036	97.7	AMELIN 99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma\left(b_1(1235)\pi\right)/\Gamma_{\text{total}}$ Γ_{16}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0019	97.7	AMELIN 99	VES	37 $\pi^- A \to \omega\pi^-\pi^0 A^*$

$\Gamma\left(f_1(1285)\pi\right)/\Gamma_{\text{total}}$ Γ_{17}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
possibly seen	69k	KUHN 04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

$\Gamma\left(a_2(1320)\pi\right)/\Gamma_{\text{total}}$ Γ_{18}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
not seen	69k	KUHN 04	B852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

D-wave/*S*-wave RATIO FOR $\pi_2(1670) \to f_2(1270)\pi$

VALUE	DOCUMENT ID	TECN	COMMENT
−0.18±0.06	[24] BAKER 99	SPEC	1.94 $\overline{p}p \to 4\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.22±0.10	[26] DAUM 81B	SPEC	63,94 $\pi^- p$

F-wave/*P*-wave RATIO FOR $\pi_2(1670) \to \rho\pi$

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.72 \pm 0.07 \pm 0.14$	CHUNG	02	B852	18.3 $\pi^- p \to \pi^+ \pi^- \pi^- p$

[24] Using preliminary CBAR data.

[25] With the $\sigma\pi$ in $L=2$ and the $f_2(1270)\pi$ in $L=0$.

[26] From a two-resonance fit to four 2^-0^+ waves.

[27] From a partial-wave analysis of $K^+ K^- \pi^-$ system.

[28] Normalized to the B($\pi_2(1670) \to f_2\pi$).

$\pi_2(1670)$ REFERENCES

AGHASYAN	18B	PR D98 092003	M. Aghasyan *et al.*	(COMPASS Collab.)
ADOLPH	14	EPJ A50 79	C. Adolph *et al.*	(COMPASS Collab.)
ALEKSEEV	10	PRL 104 241803	M.G. Alekseev *et al.*	(COMPASS Collab.)
SCHEGELSKY	06	EPJ A27 199	V.A. Schegelsky *et al.*	
LU	05	PRL 94 032002	M. Lu *et al.*	(BNL E852 Collab.)
KUHN	04	PL B595 109	J. Kuhn *et al.*	(BNL E852 Collab.)
CHUNG	02	PR D65 072001	S.U. Chung *et al.*	(BNL E852 Collab.)
BARBERIS	01	PL B507 14	D. Barberis *et al.*	
AMELIN	99	PAN 62 445	D.V. Amelin *et al.*	(VES Collab.)
		Translated from YAF 62 487.		
BAKER	99	PL B449 114	C.A. Baker *et al.*	
BARBERIS	98B	PL B422 399	D. Barberis *et al.*	(WA 102 Collab.)
ACCIARRI	97T	PL B413 147	M. Acciarri *et al.*	(L3 Collab.)
ALBRECHT	97B	ZPHY C74 469	H. Albrecht *et al.*	(ARGUS Collab.)
AMELIN	95B	PL B356 595	D.V. Amelin *et al.*	(SERP, TBIL)
BERDNIKOV	94	PL B337 219	E.B. Berdnikov *et al.*	(SERP, TBIL)
ANTREASYAN	90	ZPHY C48 561	D. Antreasyan *et al.*	(Crystal Ball Collab.)
BEHREND	90C	ZPHY C46 583	H.J. Behrend *et al.*	(CELLO Collab.)
ANTIPOV	87	EPL 4 403	Y.M. Antipov *et al.*	(SERP, JINR, INRM+)
BELLINI	85	SJNP 41 781	D. Bellini *et al.*	
		Translated from YAF 41 1223.		
ARMSTRONG	82B	NP B202 1	T.A. Armstrong, B. Baccari	(AACH3, BARI, BONN+)
DAUM	81B	NP B182 269	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)
EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)
Also		NP B186 594	C. Evangelista	
DAUM	80D	PL 89B 285	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+) JP
BALTAY	77	PRL 39 591	C. Baltay, C.V. Cautis, M. Kalelkar	(COLU) JP
ASCOLI	73	PR D7 669	G. Ascoli	(ILL, TNTO, GENO, HAMB, MILA+) JP
CRENNELL	70	PRL 24 781	D.J. Crennell *et al.*	(BNL)
ARMENISE	69	LNC 2 501	N. Armenise *et al.*	(BARI, BGNA, FIRZ)
BALTAY	68	PRL 20 887	C. Baltay *et al.*	(COLU, ROCH, RUTG, YALE) I
BARTSCH	68	NP B7 345	J. Bartsch *et al.*	(AACH, BERL, CERN) JP