

$K_2^*(1430)$

$$I(J^P) = \frac{1}{2}(2^+)$$

We consider that phase-shift analyses provide more reliable determinations of the mass and width.

$K_2^*(1430)$ MASS

CHARGED ONLY, WITH FINAL STATE $K\pi$

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
1425.6 ± 1.5 OUR AVERAGE Error includes scale factor of 1.1.					
1420 ± 4	1587	BAUBILLIER	84B HBC	–	8.25 $K^- p \rightarrow \bar{K}^0 \pi^- p$
1436 ± 5.5	400	^{1,2} CLELAND	82 SPEC	+	30 $K^+ p \rightarrow K_S^0 \pi^+ p$
1430 ± 3.2	1500	^{1,2} CLELAND	82 SPEC	+	50 $K^+ p \rightarrow K_S^0 \pi^+ p$
1430 ± 3.2	1200	^{1,2} CLELAND	82 SPEC	–	50 $K^+ p \rightarrow K_S^0 \pi^- p$
1423 ± 5	935	TOAFF	81 HBC	–	6.5 $K^- p \rightarrow \bar{K}^0 \pi^- p$
1428.0 ± 4.6		³ MARTIN	78 SPEC	+	10 $K^\pm p \rightarrow K_S^0 \pi p$
1423.8 ± 4.6		³ MARTIN	78 SPEC	–	10 $K^\pm p \rightarrow K_S^0 \pi p$
1420.0 ± 3.1	1400	AGUILAR-...	71B HBC	–	3.9,4.6 $K^- p$
1425 ± 8.0	225	^{1,2} BARNHAM	71C HBC	+	$K^+ p \rightarrow K^0 \pi^+ p$
1416 ± 10	220	CRENNELL	69D DBC	–	3.9 $K^- N \rightarrow \bar{K}^0 \pi^- N$
1414 ± 13.0	60	¹ LIND	69 HBC	+	9 $K^+ p \rightarrow K^0 \pi^+ p$
1427 ± 12	63	¹ SCHWEING...	68 HBC	–	5.5 $K^- p \rightarrow \bar{K} \pi N$
1423 ± 11.0	39	¹ BASSANO	67 HBC	–	4.6–5.0 $K^- p \rightarrow \bar{K}^0 \pi^- p$

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

1423.4 ± 2 ± 3	24809 ± 820	⁴ BIRD	89 LASS	–	11 $K^- p \rightarrow \bar{K}^0 \pi^- p$
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NEUTRAL ONLY

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
1432.4 ± 1.3 OUR AVERAGE					
1431.2 ± 1.8 ± 0.7		⁵ ASTON	88 LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
1434 ± 4 ± 6		⁵ ASTON	87 LASS	0	11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
1433 ± 6 ± 10		⁵ ASTON	84B LASS	0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
1471 ± 12		⁵ BAUBILLIER	82B HBC	0	8.25 $K^- p \rightarrow NK_S^0 \pi \pi$
1428 ± 3		⁵ ASTON	81C LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
1434 ± 2		⁵ ESTABROOKS	78 ASPK	0	13 $K^\pm p \rightarrow p K \pi$
1440 ± 10		⁵ BOWLER	77 DBC	0	5.5 $K^+ d \rightarrow K \pi p p$

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

1420 ± 7	300	HENDRICK	76	DBC		8.25 $K^+ N \rightarrow K^+ \pi N$
1421.6 ± 4.2	800	MCCUBBIN	75	HBC	0	3.6 $K^- p \rightarrow K^- \pi^+ n$
1420.1 ± 4.3		⁶ LINGLIN	73	HBC	0	2-13 $K^+ p \rightarrow K^+ \pi^- X$
1419.1 ± 3.7	1800	AGUILAR-...	71B	HBC	0	3.9,4.6 $K^- p$
1416 ± 6	600	CORDS	71	DBC	0	9 $K^+ n \rightarrow K^+ \pi^- p$
1421.1 ± 2.6	2200	DAVIS	69	HBC	0	12 $K^+ p \rightarrow K^+ \pi^- X$

¹ Errors enlarged by us to Γ/\sqrt{N} ; see the note with the $K^*(892)$ mass.

² Number of events in peak re-evaluated by us.

³ Systematic error added by us.

⁴ From a partial wave amplitude analysis.

⁵ From phase shift or partial-wave analysis.

⁶ From pole extrapolation, using world $K^+ p$ data summary tape.

$K_2^*(1430)$ WIDTH

CHARGED ONLY, WITH FINAL STATE $K\pi$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
98.5 ± 2.7 OUR FIT	Error includes scale factor of 1.1.					
98.5 ± 2.9 OUR AVERAGE	Error includes scale factor of 1.1.					
109 ± 22	400	^{7,8} CLELAND	82	SPEC	+	30 $K^+ p \rightarrow K_S^0 \pi^+ p$
124 ± 12.8	1500	^{7,8} CLELAND	82	SPEC	+	50 $K^+ p \rightarrow K_S^0 \pi^+ p$
113 ± 12.8	1200	^{7,8} CLELAND	82	SPEC	-	50 $K^+ p \rightarrow K_S^0 \pi^- p$
85 ± 16	935	TOAFF	81	HBC	-	6.5 $K^- p \rightarrow \bar{K}^0 \pi^- p$
96.5 ± 3.8		MARTIN	78	SPEC	+	10 $K^\pm p \rightarrow K_S^0 \pi p$
97.7 ± 4.0		MARTIN	78	SPEC	-	10 $K^\pm p \rightarrow K_S^0 \pi p$
94.7 ^{+15.1} _{-12.5}	1400	AGUILAR-...	71B	HBC	-	3.9,4.6 $K^- p$

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

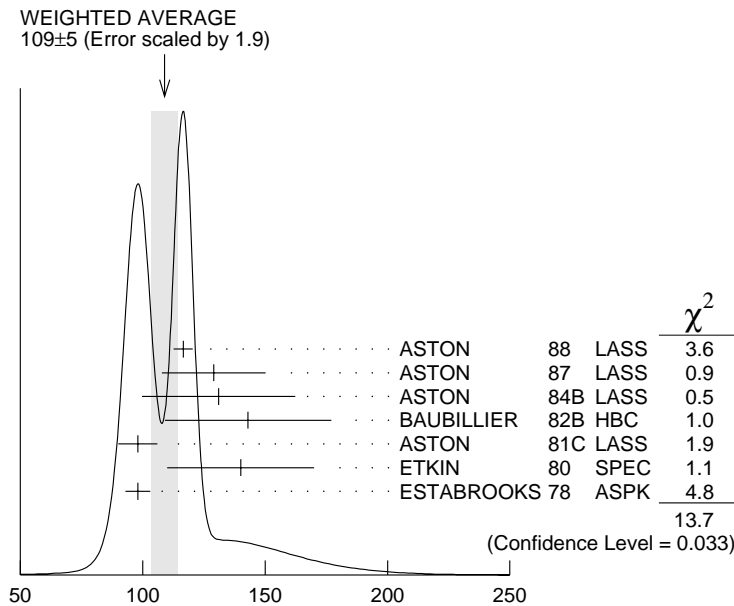
98 ± 4 ± 4	24809 ± 820	⁹ BIRD	89	LASS	-	11 $K^- p \rightarrow \bar{K}^0 \pi^- p$
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NEUTRAL ONLY

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
109 ± 5 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.					
116.5 ± 3.6 ± 1.7		¹⁰ ASTON	88	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
129 ± 15 ± 15		¹⁰ ASTON	87	LASS	0	11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
131 ± 24 ± 20		¹⁰ ASTON	84B	LASS	0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
143 ± 34		¹⁰ BAUBILLIER	82B	HBC	0	8.25 $K^- p \rightarrow NK_S^0 \pi \pi$
98 ± 8		¹⁰ ASTON	81C	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
140 ± 30		¹⁰ ETKIN	80	SPEC	0	6 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
98 ± 5		¹⁰ ESTABROOKS	78	ASPK	0	13 $K^\pm p \rightarrow p K \pi$

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

125 ± 29	300	⁷ HENDRICK	76	DBC	8.25 $K^+ N \rightarrow K^+ \pi N$
116 ± 18	800	MCCUBBIN	75	HBC	0 $3.6 K^- p \rightarrow K^- \pi^+ n$
61 ± 14		¹¹ LINGLIN	73	HBC	0 $2-13 K^+ p \rightarrow K^+ \pi^- X$
116.6 ^{+10.3} _{-15.5}	1800	AGUILAR-...	71B	HBC	0 $3.9, 4.6 K^- p$
144 ± 24.0	600	⁷ CORDS	71	DBC	0 $9 K^+ n \rightarrow K^+ \pi^- p$
101 ± 10	2200	DAVIS	69	HBC	0 $12 K^+ p \rightarrow K^+ \pi^- \pi^+ p$



$K_2^*(1430)^0$ width (MeV)

⁷ Errors enlarged by us to $4\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.

⁸ Number of events in peak re-evaluated by us.

⁹ From a partial wave amplitude analysis.

¹⁰ From phase shift or partial-wave analysis.

¹¹ From pole extrapolation, using world $K^+ p$ data summary tape.

$K_2^*(1430)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1 $K \pi$	(49.9 ± 1.2) %	
Γ_2 $K^*(892) \pi$	(24.7 ± 1.5) %	
Γ_3 $K^*(892) \pi \pi$	(13.4 ± 2.2) %	
Γ_4 $K \rho$	(8.7 ± 0.8) %	S=1.2

Γ_5	$K\omega$	$(2.9 \pm 0.8) \%$	
Γ_6	$K^+\gamma$	$(2.4 \pm 0.5) \times 10^{-3}$	S=1.1
Γ_7	$K\eta$	$(1.5^{+3.4}_{-1.0}) \times 10^{-3}$	S=1.3
Γ_8	$K\omega\pi$	$< 7.2 \times 10^{-4}$	CL=95%
Γ_9	$K^0\gamma$	$< 9 \times 10^{-4}$	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, and 10 branching ratios uses 31 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 20.2$ for 24 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, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	-9						
x_3	-40	-73					
x_4	-8	36	-52				
x_5	-11	-3	-26	-7			
x_6	-1	-1	-1	-1	0		
x_7	-4	-7	-5	-5	-2	0	
Γ	0	0	0	0	0	-13	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7

Mode	Rate (MeV)	Scale factor
Γ_1 $K\pi$	49.1 ± 1.8	
Γ_2 $K^*(892)\pi$	24.3 ± 1.6	
Γ_3 $K^*(892)\pi\pi$	13.2 ± 2.2	
Γ_4 $K\rho$	8.5 ± 0.8	1.2
Γ_5 $K\omega$	2.9 ± 0.8	
Γ_6 $K^+\gamma$	0.24 ± 0.05	1.1
Γ_7 $K\eta$	$0.15^{+0.33}_{-0.10}$	1.3

$K_2^*(1430)$ PARTIAL WIDTHS

$\Gamma(K^+\gamma)$		Γ_6		
VALUE (keV)	DOCUMENT ID	TECN	CHG	COMMENT
241 ± 50 OUR FIT	Error includes scale factor of 1.1.			
240 ± 45	CIHANGIR	82	SPEC	+
	200 $K^+Z \rightarrow ZK^+\pi^0,$ $ZK_S^0\pi^+$			

$\Gamma(K^0\gamma)$						Γ_9
VALUE (keV)	CL%	DOCUMENT ID	TECN	CHG	COMMENT	
<84	90	CARLSMITH	87	SPEC	0	60-200 $K_L^0 A \rightarrow K_S^0 \pi^0 A$

$K_2^*(1430)$ BRANCHING RATIOS

$\Gamma(K\pi)/\Gamma_{\text{total}}$						Γ_1/Γ
VALUE		DOCUMENT ID	TECN	CHG	COMMENT	
0.499±0.012						OUR FIT
0.488±0.014						OUR AVERAGE
0.485±0.006±0.020	¹²	ASTON	88	LASS	0	11 $K^- p \rightarrow K^- \pi^+ n$
0.49 ±0.02	¹²	ESTABROOKS	78	ASPK	±	13 $K^\pm p \rightarrow p K \pi$

$\Gamma(K^*(892)\pi)/\Gamma(K\pi)$						Γ_2/Γ_1
VALUE		DOCUMENT ID	TECN	CHG	COMMENT	
0.496±0.034						OUR FIT
0.47 ±0.04						OUR AVERAGE
0.44 ±0.09		ASTON	84B	LASS	0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
0.62 ±0.19		LAUSCHER	75	HBC	0	10,16 $K^- p \rightarrow K^- \pi^+ n$
0.54 ±0.16		DEHM	74	DBC	0	4.6 $K^+ N$
0.47 ±0.08		AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.47 ±0.10		BASSANO	67	HBC	-0	4.6,5.0 $K^- p$
0.45 ±0.13		BADIER	65C	HBC	-	3 $K^- p$

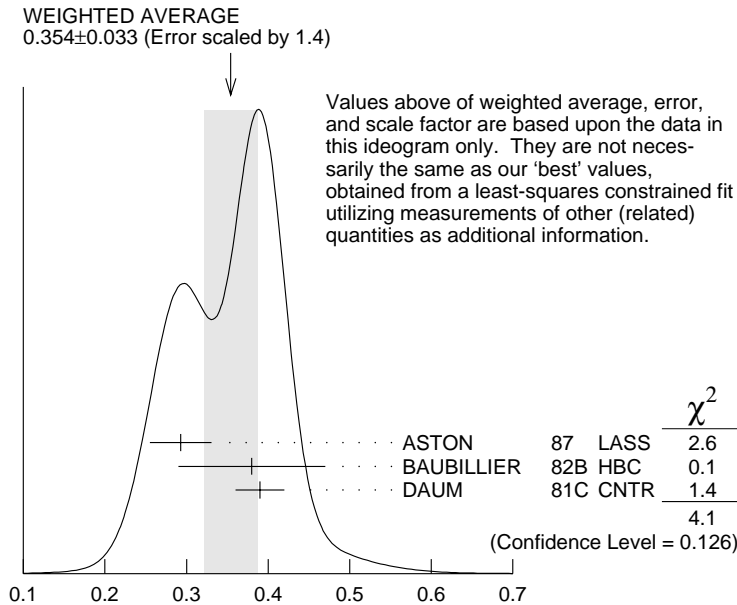
$\Gamma(K\omega)/\Gamma(K\pi)$						Γ_5/Γ_1
VALUE		DOCUMENT ID	TECN	CHG	COMMENT	
0.059±0.017						OUR FIT
0.070±0.035						OUR AVERAGE
0.05 ±0.04		AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.13 ±0.07		BASSOMPIE...	69	HBC	0	5 $K^+ p$

$\Gamma(K\rho)/\Gamma(K\pi)$						Γ_4/Γ_1
VALUE		DOCUMENT ID	TECN	CHG	COMMENT	
0.174±0.017						OUR FIT
						Error includes scale factor of 1.2.
0.150^{+0.029}_{-0.017}						OUR AVERAGE
0.18 ±0.05		ASTON	84B	LASS	0	11 $K^- p \rightarrow \bar{K}^0 2\pi n$
0.02 ^{+0.10} _{-0.02}		DEHM	74	DBC	0	4.6 $K^+ N$
0.16 ±0.05		AGUILAR-...	71B	HBC		3.9,4.6 $K^- p$
0.14 ±0.10		BASSANO	67	HBC	-0	4.6,5.0 $K^- p$
0.14 ±0.07		BADIER	65C	HBC	-	3 $K^- p$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$

Γ_4/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.350±0.031 OUR FIT	Error includes scale factor of 1.4.			
0.354±0.033 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.			
0.293±0.032±0.020	ASTON	87	LASS	0 11 $K^- p \rightarrow \bar{K}^0 \pi^+ \pi^- n$
0.38 ±0.09	BAUBILLIER	82B	HBC	0 8.25 $K^- p \rightarrow NK_S^0 \pi \pi$
0.39 ±0.03	DAUM	81C	CNTR	63 $K^- p \rightarrow K^- 2\pi p$



$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$

$\Gamma(K\omega)/\Gamma(K^*(892)\pi)$

Γ_5/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.118±0.034 OUR FIT				
0.10 ±0.04	FIELD	67	HBC	- 3.8 $K^- p$

$\Gamma(K\eta)/\Gamma(K^*(892)\pi)$

Γ_7/Γ_2

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.006^{+0.014}_{-0.004} OUR FIT	Error includes scale factor of 1.2.			
0.07 ±0.04	FIELD	67	HBC	- 3.8 $K^- p$

$\Gamma(K\eta)/\Gamma(K\pi)$

Γ_7/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
0.0030^{+0.0068}_{-0.0020} OUR FIT		Error includes scale factor of 1.3.			
0 ±0.0056	13	ASTON	88B	LASS	- 11 $K^- p \rightarrow K^- \eta p$

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

<0.04	95	AGUILAR-...	71B	HBC	3.9,4.6	$K^- p$
<0.065		¹⁴ BASSOMPIE...	69	HBC	5.0	$K^+ p$
<0.02		BISHOP	69	HBC	3.5	$K^+ p$

$\Gamma(K^*(892)\pi\pi)/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.134±0.022 OUR FIT				
0.12 ±0.04	¹⁵ GOLDBERG	76	HBC	– 3 $K^- p \rightarrow p \bar{K}^0 \pi \pi \pi$

$\Gamma(K^*(892)\pi\pi)/\Gamma(K\pi)$ Γ_3/Γ_1

VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.27±0.05 OUR FIT				
0.21±0.08	^{14,15} JONGEJANS	78	HBC	– 4 $K^- p \rightarrow p \bar{K}^0 \pi \pi \pi$

$\Gamma(K\omega\pi)/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<0.72	95	0	JONGEJANS	78	HBC 4 $K^- p \rightarrow p \bar{K}^0 4\pi$

¹² From phase shift analysis.

¹³ ASTON 88B quote < 0.0092 at CL=95%. We convert this to a central value and 1 sigma error in order to be able to use it in our constrained fit.

¹⁴ Restated by us.

¹⁵ Assuming $\pi\pi$ system has isospin 1, which is supported by the data.

$K_2^*(1430)$ REFERENCES

BIRD	89	SLAC-332	P.F. Bird	(SLAC)
ASTON	88	NP B296 493	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON	88B	PL B201 169	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
ASTON	87	NP B292 693	D. Aston <i>et al.</i>	(SLAC, NAGO, CINC, INUS)
CARLSMITH	87	PR D36 3502	D. Carlsmith <i>et al.</i>	(EFI, SACL)
ASTON	84B	NP B247 261	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA)
BAUBILLIER	84B	ZPHY C26 37	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
BAUBILLIER	82B	NP B202 21	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
CIHANGIR	82	PL 117B 123	S. Cihangir <i>et al.</i>	(FNAL, MINN, ROCH)
CLELAND	82	NP B208 189	W.E. Cleland <i>et al.</i>	(DURH, GEVA, LAUS+)
ASTON	81C	PL 106B 235	D. Aston <i>et al.</i>	(SLAC, CARL, OTTA) JP
DAUM	81C	NP B187 1	C. Daum <i>et al.</i>	(AMST, CERN, CRAC, MPIM+)
TOAFF	81	PR D23 1500	S. Toaff <i>et al.</i>	(ANL, KANS)
ETKIN	80	PR D22 42	A. Etkin <i>et al.</i>	(BNL, CUNY) JP
ESTABROOKS	78	NP B133 490	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
Also	78B	PR D17 658	P.G. Estabrooks <i>et al.</i>	(MCGI, CARL, DURH+)
JONGEJANS	78	NP B139 383	B. Jongejans <i>et al.</i>	(ZEEM, CERN, NIJM+)
MARTIN	78	NP B134 392	A.D. Martin <i>et al.</i>	(DURH, GEVA)
BOWLER	77	NP B126 31	M.G. Bowler <i>et al.</i>	(OXF)
GOLDBERG	76	LNC 17 253	J. Goldberg	(HAIF)
HENDRICK	76	NP B112 189	K. Hendrickx <i>et al.</i>	(MONS, SACL, PARIS+)
LAUSCHER	75	NP B86 189	P. Lauscher <i>et al.</i>	(ABCLV Collab.) JP
MCCUBBIN	75	NP B86 13	N.A. McCubbin, L. Lyons	(OXF)

DEHM	74	NP B75 47	G. Dehm <i>et al.</i>	(MPIM, BRUX, MONS, CERN)
LINGLIN	73	NP B55 408	D. Linglin	(CERN)
AGUILAR-...	71B	PR D4 2583	M. Aguilar-Benitez, R.L. Eisner, J.B. Kinson	(BNL)
BARNHAM	71C	NP B28 171	K.W.J. Barnham <i>et al.</i>	(BIRM, GLAS)
CORDS	71	PR D4 1974	D. Cords <i>et al.</i>	(PURD, UCD, IUPU)
BASSOMPIE...	69	NP B13 189	G. Bassompierre <i>et al.</i>	(CERN, BRUX) JP
BISHOP	69	NP B9 403	J.M. Bishop <i>et al.</i>	(WISC)
CRENNELL	69D	PRL 22 487	D.J. Crennell <i>et al.</i>	(BNL)
DAVIS	69	PRL 23 1071	P.J. Davis <i>et al.</i>	(LRL)
LIND	69	NP B14 1	V.G. Lind <i>et al.</i>	(LRL) JP
SCHWEING...	68	PR 166 1317	F. Schweingruber <i>et al.</i>	(ANL, NWES)
Also	67	Thesis	F.L. Schweingruber	(NWES, NWES)
BASSANO	67	PRL 19 968	D. Bassano <i>et al.</i>	(BNL, SYRA)
FIELD	67	PL 24B 638	J.H. Field <i>et al.</i>	(UCSD)
BADIER	65C	PL 19 612	J. Badier <i>et al.</i>	(EPOL, SACL, AMST)

OTHER RELATED PAPERS

BARBERIS	98E	PL B436 204	D. Barberis <i>et al.</i>	(Omega expt.)
ATKINSON	86	ZPHY C30 521	M. Atkinson <i>et al.</i>	(BONN, CERN, GLAS+)
BAUBILLIER	82B	NP B202 21	M. Baubillier <i>et al.</i>	(BIRM, CERN, GLAS+)
CHUNG	65	PRL 15 325	S.U. Chung <i>et al.</i>	(LRL)
FOCARDI	65	PL 16 351	S. Focardi <i>et al.</i>	(BGNA, SACL)
HAQUE	65	PL 14 338	N. Haque <i>et al.</i>	
HARDY	65	PRL 14 401	L.M. Hardy <i>et al.</i>	(LRL)