

**$N(1710) 1/2^+$**  $I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$  Status: \*\*\*\*Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014). **$N(1710)$  POLE POSITION****REAL PART**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>1650 to 1750 (<math>\approx 1700</math>) OUR ESTIMATE</b>			
1605 $\pm$ 7	ROENCHEN 22	DPWA	Multichannel
1690 $\pm$ 15	ANISOVICH 17A	DPWA	Multichannel
1697 $\pm$ 23	<sup>1</sup> ANISOVICH 17A	L+P	$\gamma p, \pi^- p \rightarrow K \Lambda$
1770 $\pm$ 5 $\pm$ 2	<sup>2</sup> SVARC 14	L+P	$\pi N \rightarrow \pi N$
1690 $\pm$ 20	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1615	HUNT 19	DPWA	Multichannel
1651	ROENCHEN 15A	DPWA	Multichannel
1690 $\pm$ 15	SOKHOYAN 15A	DPWA	Multichannel
1690 $\pm$ 15	GUTZ 14	DPWA	Multichannel
1670	SHKLYAR 13	DPWA	Multichannel
1687 $\pm$ 17	ANISOVICH 12A	DPWA	Multichannel
1711 $\pm$ 15	<sup>3</sup> BATINIC 10	DPWA	$\pi N \rightarrow N\pi, N\eta$
1679	VRANA 00	DPWA	Multichannel
1690	HOEHLER 93	SPED	$\pi N \rightarrow \pi N$
1698	CUTKOSKY 90	IPWA	$\pi N \rightarrow \pi N$

<sup>1</sup> Statistical error only.<sup>2</sup> Fit to the amplitudes of HOEHLER 79.<sup>3</sup> BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.**-2xIMAGINARY PART**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>80 to 160 (<math>\approx 120</math>) OUR ESTIMATE</b>			
115 $\pm$ 5	ROENCHEN 22	DPWA	Multichannel
155 $\pm$ 25	ANISOVICH 17A	DPWA	Multichannel
84 $\pm$ 34	<sup>1</sup> ANISOVICH 17A	L+P	$\gamma p, \pi^- p \rightarrow K \Lambda$
98 $\pm$ 8 $\pm$ 5	<sup>2</sup> SVARC 14	L+P	$\pi N \rightarrow \pi N$
80 $\pm$ 20	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
169	HUNT 19	DPWA	Multichannel
121	ROENCHEN 15A	DPWA	Multichannel
170 $\pm$ 20	SOKHOYAN 15A	DPWA	Multichannel
170 $\pm$ 20	GUTZ 14	DPWA	Multichannel
159	SHKLYAR 13	DPWA	Multichannel
200 $\pm$ 25	ANISOVICH 12A	DPWA	Multichannel
174 $\pm$ 16	<sup>3</sup> BATINIC 10	DPWA	$\pi N \rightarrow N\pi, N\eta$
132	VRANA 00	DPWA	Multichannel
200	HOEHLER 93	SPED	$\pi N \rightarrow \pi N$
88	CUTKOSKY 90	IPWA	$\pi N \rightarrow \pi N$

<sup>1</sup> Statistical error only.

<sup>2</sup> Fit to the amplitudes of HOEHLER 79.<sup>3</sup> BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

---

## **$N(1710)$ ELASTIC POLE RESIDUE**

### **MODULUS $|r|$**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>4 to 10 (<math>\approx 7</math>) OUR ESTIMATE</b>			
$5.5 \pm 2.4$	ROENCHEN 22	DPWA	Multichannel
$6 \pm 3$	SOKHOYAN 15A	DPWA	Multichannel
$5 \pm 1 \pm 1$	<sup>1</sup> SVARC 14	L+P	$\pi N \rightarrow \pi N$
$8 \pm 2$	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
3.2	ROENCHEN 15A	DPWA	Multichannel
$6 \pm 3$	GUTZ 14	DPWA	Multichannel
11	SHKLYAR 13	DPWA	Multichannel
$6 \pm 4$	ANISOVICH 12A	DPWA	Multichannel
24	<sup>2</sup> BATINIC 10	DPWA	$\pi N \rightarrow N\pi, N\eta$
15	HOEHLER 93	SPED	$\pi N \rightarrow \pi N$
9	CUTKOSKY 90	IPWA	$\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.<sup>2</sup> BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

### **PHASE $\theta$**

<u>VALUE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>120 to 270 (<math>\approx 190</math>) OUR ESTIMATE</b>			
$-114 \pm 29$	ROENCHEN 22	DPWA	Multichannel
$130 \pm 35$	SOKHOYAN 15A	DPWA	Multichannel
$-104 \pm 7 \pm 3$	<sup>1</sup> SVARC 14	L+P	$\pi N \rightarrow \pi N$
$175 \pm 35$	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
55	ROENCHEN 15A	DPWA	Multichannel
$120 \pm 45$	GUTZ 14	DPWA	Multichannel
9	SHKLYAR 13	DPWA	Multichannel
$120 \pm 70$	ANISOVICH 12A	DPWA	Multichannel
20	<sup>2</sup> BATINIC 10	DPWA	$\pi N \rightarrow N\pi, N\eta$
$-167$	CUTKOSKY 90	IPWA	$\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.<sup>2</sup> BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

---

## **$N(1710)$ INELASTIC POLE RESIDUE**

The “normalized residue” is the residue divided by  $\Gamma_{pole}/2$ .

### **Normalized residue in $N\pi \rightarrow N(1710) \rightarrow N\eta$**

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.28 \pm 0.13$	$91 \pm 32$	ROENCHEN 22	DPWA	Multichannel
$0.12 \pm 0.04$	$0 \pm 45$	ANISOVICH 12A	DPWA	Multichannel

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

0.16                    – 180                    ROENCHEN    15A   DPWA   Multichannel

### Normalized residue in $N\pi \rightarrow N(1710) \rightarrow \Lambda K$

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.20±0.10	– 144 ± 39	ROENCHEN	22	DPWA Multichannel
0.16±0.05	– 160 ± 25	ANISOVICH	17A	DPWA Multichannel
0.12 <sup>+0.24</sup> <sub>–0.12</sub>	– 119 ± 83	<sup>1</sup> ANISOVICH	17A	L+P $\gamma p, \pi^- p \rightarrow K \Lambda$

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

0.12                    – 32                    ROENCHEN    15A   DPWA   Multichannel  
 0.17±0.06            – 110 ± 20            ANISOVICH    12A   DPWA   Multichannel

<sup>1</sup>Statistical error only.

### Normalized residue in $N\pi \rightarrow N(1710) \rightarrow \Sigma K$

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.055±0.024	162 ± 153	ROENCHEN	22	DPWA Multichannel

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

0.004                    – 43                    ROENCHEN    15A   DPWA   Multichannel

### Normalized residue in $N\pi \rightarrow N(1710) \rightarrow N(1535)\pi$

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.10±0.04	140 ± 40	GUTZ	14	DPWA Multichannel

## **$N(1710)$ BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1680 to 1740 (<math>\approx 1710</math>) OUR ESTIMATE</b>			
1648±16	<sup>1</sup> HUNT	19	DPWA Multichannel
1715±20	SOKHOYAN	15A	DPWA Multichannel
1737±17	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
1700±50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
1723± 9	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1715±20	GUTZ	14	DPWA Multichannel
1710±20	ANISOVICH	12A	DPWA Multichannel
1662± 7	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
1729±16	<sup>2</sup> BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1752± 3	PENNER	02C	DPWA Multichannel
1699±65	VRANA	00	DPWA Multichannel

<sup>1</sup>Statistical error only.

<sup>2</sup>BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

## **$N(1710)$ BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>80 to 200 (<math>\approx 140</math>) OUR ESTIMATE</b>			
195± 46	<sup>1</sup> HUNT	19	DPWA Multichannel
175± 15	SOKHOYAN	15A	DPWA Multichannel
368±120	<sup>1</sup> SHKLYAR	13	DPWA Multichannel

93 ± 30	CUTKOSKY	90	IPWA	$\pi N \rightarrow \pi N$
90 ± 30	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
120 ± 15	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$

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

175 ± 15	GUTZ	14	DPWA	Multichannel
200 ± 18	ANISOVICH	12A	DPWA	Multichannel
116 ± 17	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
180 ± 17	<sup>2</sup> BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
386 ± 59	PENNER	02C	DPWA	Multichannel
143 ± 100	VRANA	00	DPWA	Multichannel

<sup>1</sup> Statistical error only.

<sup>2</sup> BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

## N(1710) DECAY MODES

The following branching fractions are our estimates, not fits or averages.

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\pi$	5–20 %
$\Gamma_2$ $N\eta$	10–50 %
$\Gamma_3$ $N\omega$	1–5 %
$\Gamma_4$ $\Lambda K$	5–25 %
$\Gamma_5$ $\Sigma K$	seen
$\Gamma_6$ $N\pi\pi$	14–48 %
$\Gamma_7$ $\Delta(1232)\pi$ , $P$ -wave	3–9 %
$\Gamma_8$ $N\rho$ , $S=1/2$ , $P$ -wave	11–23 %
$\Gamma_9$ $N\sigma$	<16 %
$\Gamma_{10}$ $N(1535)\pi$	9–21 %
$\Gamma_{11}$ $p\gamma$ , helicity=1/2	0.002–0.08 %
$\Gamma_{12}$ $n\gamma$ , helicity=1/2	0.0–0.02%

## N(1710) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$				$\Gamma_1/\Gamma$
VALUE (%)	DOCUMENT ID	TECN	COMMENT	
<b>5 to 20 (<math>\approx 10</math>) OUR ESTIMATE</b>				
12 ± 6	<sup>1</sup> HUNT	19	DPWA	Multichannel
5 ± 3	SOKHOYAN	15A	DPWA	Multichannel
2 ± 2	<sup>1</sup> SHKLYAR	13	PWA	Multichannel
20 ± 4	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
12 ± 4	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5 ± 3	GUTZ	14	DPWA	Multichannel
5 ± 4	ANISOVICH	12A	DPWA	Multichannel
15 ± 4	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel

$22 \pm 24$	<sup>2</sup> BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
$14 \pm 8$	PENNER	02C	DPWA	Multichannel
$27 \pm 13$	VRANA	00	DPWA	Multichannel

<sup>1</sup>Statistical error only.

<sup>2</sup>BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

### $\Gamma(N\eta)/\Gamma_{\text{total}}$

$\Gamma_2/\Gamma$

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>10 to 50 (<math>\approx 30</math>) OUR ESTIMATE</b>			
$18 \pm 10$	MUELLER	20	DPWA Multichannel
$17 \pm 8$	<sup>1</sup> HUNT	19	DPWA Multichannel
$45 \pm 4$	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
$17 \pm 10$	ANISOVICH	12A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$11 \pm 7$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
$6 \pm 8$	<sup>2</sup> BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
$36 \pm 11$	PENNER	02C	DPWA Multichannel
$6 \pm 1$	VRANA	00	DPWA Multichannel

<sup>1</sup>Statistical error only.

<sup>2</sup>BATINIC 10 finds evidence for a second  $P_{11}$  state with all parameters except for the phase of the pole residue very similar to the parameters we give here.

### $\Gamma(N\omega)/\Gamma_{\text{total}}$

$\Gamma_3/\Gamma$

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1 to 5 (<math>\approx 3</math>) OUR ESTIMATE</b>			
$2 \pm 2$	DENISENKO	16	DPWA Multichannel
$3 \pm 2$	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$13 \pm 2$	PENNER	02C	DPWA Multichannel

<sup>1</sup>Statistical error only.

### $\Gamma(\Lambda K)/\Gamma_{\text{total}}$

$\Gamma_4/\Gamma$

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>5 to 25 (<math>\approx 15</math>) OUR ESTIMATE</b>			
$1.8 \pm 1.5$	<sup>1</sup> HUNT	19	DPWA Multichannel
$23 \pm 7$	ANISOVICH	12A	DPWA Multichannel
$5 \pm 3$	SHKLYAR	05	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$8 \pm 4$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
$5 \pm 2$	PENNER	02C	DPWA Multichannel
$10 \pm 10$	VRANA	00	DPWA Multichannel

<sup>1</sup>Statistical error only.

### $\Gamma(\Sigma K)/\Gamma_{\text{total}}$

$\Gamma_5/\Gamma$

<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. • • •			
$7 \pm 7$	PENNER	02C	DPWA Multichannel

$\Gamma(\Delta(1232)\pi, P\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_7/\Gamma$ 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
-----------	-------------	------	---------

**3-9 % OUR ESTIMATE**

28±9	<sup>1</sup> HUNT	19	DPWA Multichannel
------	-------------------	----	-------------------

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

6±3	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
39±8	VRANA	00	DPWA Multichannel

<sup>1</sup>Statistical error only.

 $\Gamma(N\rho, S=1/2, P\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$ 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
-----------	-------------	------	---------

**11-23 % OUR ESTIMATE**

17±9	<sup>1</sup> HUNT	19	DPWA Multichannel
------	-------------------	----	-------------------

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

17±6	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
17±1	VRANA	00	DPWA Multichannel

<sup>1</sup>Statistical error only.

 $\Gamma(N\sigma)/\Gamma_{\text{total}}$   $\Gamma_9/\Gamma$ 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
-----------	-------------	------	---------

**<16 % OUR ESTIMATE**

<16	<sup>1</sup> HUNT	19	DPWA Multichannel
-----	-------------------	----	-------------------

<sup>1</sup>Statistical error only.

 $\Gamma(N(1535)\pi)/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$ 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
-----------	-------------	------	---------

15±6	GUTZ	14	DPWA Multichannel
------	------	----	-------------------

 **$N(1710)$  PHOTON DECAY AMPLITUDES AT THE POLE** **$N(1710) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

MODULUS ( $\text{GeV}^{-1/2}$ )	PHASE ( $^\circ$ )	DOCUMENT ID	TECN	COMMENT
---------------------------------	--------------------	-------------	------	---------

-0.018±0.010	40 ± 55	ROENCHEN	22	DPWA Multichannel
--------------	---------	----------	----	-------------------

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

0.020	-83	ROENCHEN	15A	DPWA Multichannel
-------	-----	----------	-----	-------------------

 **$N(1710) \rightarrow n\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

MODULUS ( $\text{GeV}^{-1/2}$ )	PHASE ( $^\circ$ )	DOCUMENT ID	TECN	COMMENT
---------------------------------	--------------------	-------------	------	---------

0.029±0.007	80 ± 20	ANISOVICH	17E	DPWA Multichannel
-------------	---------	-----------	-----	-------------------

 **$N(1710)$  BREIT-WIGNER PHOTON DECAY AMPLITUDES** **$N(1710) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
-------------------------------	-------------	------	---------

0.014±0.008	<sup>1</sup> HUNT	19	DPWA Multichannel
-------------	-------------------	----	-------------------

0.050±0.010	SOKHOYAN	15A	DPWA Multichannel
-------------	----------	-----	-------------------

-0.050±0.001	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
--------------	----------------------	----	-------------------

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

0.05 ± 0.01	GUTZ	14	DPWA	Multichannel
0.052 ± 0.015	ANISOVICH	12A	DPWA	Multichannel
−0.008 ± 0.003	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
0.044	PENNER	02D	DPWA	Multichannel

<sup>1</sup> Statistical error only.

### $N(1710) \rightarrow n\gamma$ , helicity-1/2 amplitude $A_{1/2}$

<u>VALUE (GeV<sup>-1/2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.0053 ± 0.0003	<sup>1</sup> HUNT	19	DPWA Multichannel
−0.040 ± 0.020	ANISOVICH	13B	DPWA Multichannel

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

0.017 ± 0.003	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
−0.024	PENNER	02D	DPWA	Multichannel

<sup>1</sup> Statistical error only.

## $N(1710)$ REFERENCES

For early references, see Physics Letters **111B** 1 (1982).

ROENCHEN	22	EPJ A58 229	D. Roenchen <i>et al.</i>	(JULI, GWU, BONN+)
MUELLER	20	PL B803 135323	J. Mueller <i>et al.</i>	(CBELSA/TAPS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
ANISOVICH	17A	PRL 119 062004	A.V. Anisovich <i>et al.</i>	
ANISOVICH	17E	PR C96 055202	A.V. Anisovich <i>et al.</i>	(BONN, PNPI, JLAB+)
DENISENKO	16	PL B755 97	I. Denisenko <i>et al.</i>	
ROENCHEN	15A	EPJ A51 70	D. Roenchen <i>et al.</i>	
SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan <i>et al.</i>	(CBELSA/TAPS Collab.)
GUTZ	14	EPJ A50 74	E. Gutz <i>et al.</i>	(CBELSA/TAPS Collab.)
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	(RBI Zagreb, UNI Tuzla)
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich <i>et al.</i>	
SHKLYAR	13	PR C87 015201	V. Shklyar, H. Lenske, U. Mosel	(GIES)
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
BATINIC	10	PR C82 038203	M. Batinic <i>et al.</i>	(ZAGR)
SHKLYAR	05	PR C72 015210	V. Shklyar, H. Lenske, U. Mosel	(GIES)
PENNER	02C	PR C66 055211	G. Penner, U. Mosel	(GIES)
PENNER	02D	PR C66 055212	G. Penner, U. Mosel	(GIES)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
HOEHLER	93	$\pi N$ Newsletter 9 1	G. Hohler	(KARL)
CUTKOSKY	90	PR D42 235	R.E. Cutkosky, S. Wang	(CMU)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP