

**$N(1680) 5/2^+$**  $I(J^P) = \frac{1}{2}(\frac{5}{2}^+)$  Status: \*\*\*\*Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014). **$N(1680)$  POLE POSITION****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1660 to 1680 (<math>\approx</math> 1670) OUR ESTIMATE</b>			
1676 $\pm$ 6	SARANTSEV	25	DPWA Multichannel
1657 $\pm$ 2	ROENCHEN	22	DPWA Multichannel
1674 $\pm$ 2 $\pm$ 1	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
1667 $\pm$ 5	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1668	HUNT	19	DPWA Multichannel
1669	ROENCHEN	15A	DPWA Multichannel
1678 $\pm$ 5	SOKHOYAN	15A	DPWA Multichannel
1660	SHKLYAR	13	DPWA Multichannel
1666 $\pm$ 8	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1674	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
1667	VRANA	00	DPWA Multichannel
1673	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.**-2 $\times$ IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>110 to 135 (<math>\approx</math> 120) OUR ESTIMATE</b>			
117 $\pm$ 4	SARANTSEV	25	DPWA Multichannel
120 $\pm$ 1	ROENCHEN	22	DPWA Multichannel
129 $\pm$ 3 $\pm$ 1	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
110 $\pm$ 10	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
118	HUNT	19	DPWA Multichannel
100	ROENCHEN	15A	DPWA Multichannel
113 $\pm$ 4	SOKHOYAN	15A	DPWA Multichannel
98	SHKLYAR	13	DPWA Multichannel
135 $\pm$ 6	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
115	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
122	VRANA	00	DPWA Multichannel
135	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.

**$N(1680)$  ELASTIC POLE RESIDUE****MODULUS  $|r|$** 

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>35 to 45 (<math>\approx 40</math>) OUR ESTIMATE</b>			
$36 \pm 1$	ROENCHEN	22	DPWA Multichannel
$45 \pm 4$	SOKHOYAN	15A	DPWA Multichannel
$44 \pm 1 \pm 1$	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
$34 \pm 2$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
34	ROENCHEN	15A	DPWA Multichannel
33	SHKLYAR	13	DPWA Multichannel
$43 \pm 4$	ANISOVICH	12A	DPWA Multichannel
44	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
42	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
44	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.**PHASE  $\theta$** 

<u>VALUE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>-30 to -10 (<math>\approx -20</math>) OUR ESTIMATE</b>			
$-31 \pm 1$	ROENCHEN	22	DPWA Multichannel
$5 \pm 10$	SOKHOYAN	15A	DPWA Multichannel
$-16 \pm 1 \pm 1$	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
$-25 \pm 5$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-19	ROENCHEN	15A	DPWA Multichannel
-32	SHKLYAR	13	DPWA Multichannel
$-2 \pm 10$	ANISOVICH	12A	DPWA Multichannel
-19	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
-4	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
-17	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79. **$N(1680)$  INELASTIC POLE RESIDUE**The "normalized residue" is the residue divided by  $\Gamma_{pole}/2$ .**Normalized residue in  $N\pi \rightarrow N(1680) \rightarrow \Delta\pi, P$ -wave**

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.15 \pm 0.03$	$-60 \pm 30$	SOKHOYAN	15A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$0.15 \pm 0.03$	$-70 \pm 45$	ANISOVICH	12A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1680) \rightarrow \Delta\pi, F$ -wave**

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.23 \pm 0.04$	$90 \pm 12$	SOKHOYAN	15A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$0.23 \pm 0.04$	$85 \pm 15$	ANISOVICH	12A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1680) \rightarrow N\eta$** 

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.006 \pm 0.004$	$118 \pm 1$	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.027	136	ROENCHEN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1680) \rightarrow \Lambda K$** 

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.006 \pm 0.001$	$-119 \pm 2$	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.001	90	ROENCHEN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1680) \rightarrow \Sigma K$** 

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.001 \pm 0.001$	$-46 \pm 15$	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.004	148	ROENCHEN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1680) \rightarrow N(\pi\pi)_{S=0}^{I=0}$ -wave**

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.29 \pm 0.06$	$-45 \pm 15$	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.26 \pm 0.04$	$-56 \pm 15$	ANISOVICH	12A	DPWA Multichannel

 **$N(1680)$  BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1680 to 1690 (<math>\approx 1685</math>) OUR ESTIMATE</b>			
$1689 \pm 5$	SARANTSEV 25	DPWA	Multichannel
$1686 \pm 5$	GOLOVATCH 19	DPWA	$\gamma p \rightarrow \pi^+ \pi^- p$
$1681.0 \pm 0.1$	<sup>1</sup> HUNT 19	DPWA	Multichannel
$1676 \pm 2$	<sup>1</sup> SHKLYAR 13	DPWA	Multichannel
$1680.1 \pm 0.2$	<sup>1</sup> ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$
$1680 \pm 10$	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
$1684 \pm 3$	HOEHLER 79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$1690 \pm 5$	SOKHOYAN 15A	DPWA	Multichannel
$1682.7 \pm 0.5$	<sup>1</sup> SHRESTHA 12A	DPWA	Multichannel
$1680 \pm 7$	BATINIC 10	DPWA	$\pi N \rightarrow N\pi, N\eta$
$1679 \pm 3$	VRANA 00	DPWA	Multichannel

<sup>1</sup>Statistical error only. **$N(1680)$  BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>115 to 130 (<math>\approx 120</math>) OUR ESTIMATE</b>			
$122 \pm 5$	SARANTSEV 25	DPWA	Multichannel
$118 \pm 20$	GOLOVATCH 19	DPWA	$\gamma p \rightarrow \pi^+ \pi^- p$
$123 \pm 3$	<sup>1</sup> HUNT 19	DPWA	Multichannel

115 ± 1	<sup>1</sup> SHKLYAR	13	DPWA	Multichannel
128.0 ± 1.1	<sup>1</sup> ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
120 ± 10	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
128 ± 8	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
119 ± 4	SOKHOYAN	15A	DPWA	Multichannel
126 ± 1	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
142 ± 7	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
128 ± 9	VRANA	00	DPWA	Multichannel

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

## N(1680) DECAY MODES

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

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\pi$	60–70 %
$\Gamma_2$ $N\eta$	<1 %
$\Gamma_3$ $N\pi\pi$	28–53 %
$\Gamma_4$ $\Delta(1232)\pi$	11–23 %
$\Gamma_5$ $\Delta(1232)\pi, P\text{-wave}$	4–10 %
$\Gamma_6$ $\Delta(1232)\pi, F\text{-wave}$	1–13 %
$\Gamma_7$ $N\rho$	8–11 %
$\Gamma_8$ $N\rho, S=3/2, P\text{-wave}$	6–8 %
$\Gamma_9$ $N\rho, S=3/2, F\text{-wave}$	2–3 %
$\Gamma_{10}$ $N(1520)\pi, D\text{-wave}$	
$\Gamma_{11}$ $N\sigma$	9–19 %
$\Gamma_{12}$ $p\gamma$	0.21–0.32 %
$\Gamma_{13}$ $p\gamma, \text{helicity}=1/2$	0.001–0.011 %
$\Gamma_{14}$ $p\gamma, \text{helicity}=3/2$	0.20–0.32 %
$\Gamma_{15}$ $n\gamma$	0.021–0.046 %
$\Gamma_{16}$ $n\gamma, \text{helicity}=1/2$	0.004–0.029 %
$\Gamma_{17}$ $n\gamma, \text{helicity}=3/2$	0.01–0.024 %

## N(1680) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$					$\Gamma_1/\Gamma$
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
<b>60 to 70 (<math>\approx 65</math>) OUR ESTIMATE</b>					
68 ± 8	SEIFEN	25	DPWA	Multichannel	
68.0 ± 0.1	<sup>1</sup> HUNT	19	DPWA	Multichannel	
68 ± 1	<sup>1</sup> SHKLYAR	13	DPWA	Multichannel	
70.1 ± 0.1	<sup>1</sup> ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$	
62 ± 5	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$	
65 ± 2	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$	

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

62 ±4	SOKHOYAN	15A	DPWA	Multichannel
68.0±0.5	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
67 ±3	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
69 ±2	VRANA	00	DPWA	Multichannel

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

$\Gamma(N\eta)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
0.2 ±0.1	MUELLER	20	DPWA Multichannel
0.09±0.02	<sup>1</sup> HUNT	19	DPWA Multichannel
<1	SHKLYAR	13	DPWA Multichannel
0.15 <sup>+0.35</sup> <sub>-0.10</sub>	TIATOR	99	DPWA $\gamma p \rightarrow p\eta$

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

1.0 ±0.3	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
0.4 ±0.2	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
<1	THOMA	08	DPWA	Multichannel
0 ±1	VRANA	00	DPWA	Multichannel

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

$\Gamma(N\pi\pi)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>28-53 % OUR ESTIMATE</b>			
24±4	GOLOVATCH	19	DPWA $\gamma p \rightarrow \pi^+\pi^-p$

$\Gamma(\Delta(1232)\pi)/\Gamma_{\text{total}}$   $\Gamma_4/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>23±7</b>	SARANTSEV	25	DPWA Multichannel

$\Gamma(\Delta(1232)\pi, P\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_5/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
9 ±3	SARANTSEV	25	DPWA Multichannel
8 ±4	SEIFEN	25	DPWA Multichannel
13 ±1	<sup>1</sup> HUNT	19	DPWA Multichannel

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

7 ±3	SOKHOYAN	15A	DPWA	Multichannel
10.5±0.9	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
14 ±3	VRANA	00	DPWA	Multichannel

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

$\Gamma(\Delta(1232)\pi, F\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_6/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
14 ±6	SARANTSEV	25	DPWA Multichannel
8 ±4	SEIFEN	25	DPWA Multichannel
< 0.3	<sup>1</sup> HUNT	19	DPWA Multichannel

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

10 ±3	SOKHOYAN	15A	DPWA	Multichannel
1.0±0.1	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel

1 ± 1 VRANA 00 DPWA Multichannel

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

**$\Gamma(N\rho)/\Gamma_{\text{total}}$   $\Gamma_7/\Gamma$**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>9±4</b>	SARANTSEV 25	DPWA	Multichannel

**$\Gamma(N\rho, S=3/2, P\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>6-8 % OUR ESTIMATE</b>			
9±4	SARANTSEV 25	DPWA	Multichannel
7±1	<sup>1</sup> HUNT 19	DPWA	Multichannel

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

**$\Gamma(N\rho, S=3/2, F\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_9/\Gamma$**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<b>2-3 % OUR ESTIMATE</b>			
2.4±0.4	<sup>1</sup> HUNT 19	DPWA	Multichannel

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

**$\Gamma(N\sigma)/\Gamma_{\text{total}}$   $\Gamma_{11}/\Gamma$**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
8 ± 4	SEIFEN 25	DPWA	Multichannel
8.7±1.5	<sup>1</sup> HUNT 19	DPWA	Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
14 ± 5	SOKHOYAN 15A	DPWA	Multichannel
9.4±0.8	<sup>1</sup> SHRESTHA 12A	DPWA	Multichannel
9 ± 1	VRANA 00	DPWA	Multichannel

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

**$\Gamma(N(1520)\pi, D\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<1	SEIFEN 25	DPWA	Multichannel

**N(1680) PHOTON DECAY AMPLITUDES AT THE POLE**

**N(1680) → pγ, helicity-1/2 amplitude A<sub>1/2</sub>**

MODULUS (GeV <sup>-1/2</sup> )	PHASE (°)	DOCUMENT ID	TECN	COMMENT
-0.016±0.004	-35 ± 15	SARANTSEV 25	DPWA	Multichannel
-0.017±0.003	70 ± 7	ROENCHEN 22	DPWA	Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
-0.022	-28	ROENCHEN 15A	DPWA	Multichannel
-0.013±0.003	-20 ± 17	SOKHOYAN 15A	DPWA	Multichannel

**N(1680) → pγ, helicity-3/2 amplitude A<sub>3/2</sub>**

MODULUS (GeV <sup>-1/2</sup> )	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.134±0.005	2 ± 5	SARANTSEV 25	DPWA	Multichannel
0.095±0.003	-57 ± 4	ROENCHEN 22	DPWA	Multichannel

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

0.102	−11	ROENCHEN	15A	DPWA	Multichannel
0.135±0.005	1 ± 3	SOKHOYAN	15A	DPWA	Multichannel

**$N(1680) \rightarrow n\gamma$ , helicity-1/2 amplitude  $A_{1/2}$**

<u>MODULUS (<math>\text{GeV}^{-1/2}</math>)</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.032±0.003	−7 ± 5	ANISOVICH	17E	DPWA Multichannel

**$N(1680) \rightarrow n\gamma$ , helicity-3/2 amplitude  $A_{3/2}$**

<u>MODULUS (<math>\text{GeV}^{-1/2}</math>)</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
−0.063±0.004	−10 ± 5	ANISOVICH	17E	DPWA Multichannel

**$N(1680)$  BREIT-WIGNER PHOTON DECAY AMPLITUDES**

**$N(1680) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$**

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>−0.018 to −0.005 (<math>\approx</math> −0.010) OUR ESTIMATE</b>			

−0.016 ±0.004	SARANTSEV	25	DPWA Multichannel
−0.0278±0.0036	GOLOVATCH	19	DPWA $\gamma p \rightarrow \pi^+ \pi^- p$
−0.026 ±0.004	<sup>1</sup> HUNT	19	DPWA Multichannel
0.003 ±0.001	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
−0.007 ±0.002	<sup>1</sup> WORKMAN	12A	DPWA $\gamma N \rightarrow N\pi$
−0.017 ±0.001	<sup>1</sup> DUGGER	07	DPWA $\gamma N \rightarrow \pi N$

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

−0.015 ±0.002	SOKHOYAN	15A	DPWA Multichannel
−0.017 ±0.001	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
−0.025	DRECHSEL	07	DPWA $\gamma N \rightarrow \pi N$

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

**$N(1680) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$**

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.130 to 0.140 (<math>\approx</math> 0.135) OUR ESTIMATE</b>			

0.133±0.005	SARANTSEV	25	DPWA Multichannel
0.128±0.011	GOLOVATCH	19	DPWA $\gamma p \rightarrow \pi^+ \pi^- p$
0.112±0.005	<sup>1</sup> HUNT	19	DPWA Multichannel
0.116±0.001	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
0.140±0.002	<sup>1</sup> WORKMAN	12A	DPWA $\gamma N \rightarrow N\pi$
0.134±0.002	<sup>1</sup> DUGGER	07	DPWA $\gamma N \rightarrow \pi N$

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

0.136±0.005	SOKHOYAN	15A	DPWA Multichannel
0.136±0.001	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
0.134	DRECHSEL	07	DPWA $\gamma N \rightarrow \pi N$

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

**$N(1680) \rightarrow n\gamma$ , helicity-1/2 amplitude  $A_{1/2}$**

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.020 to 0.040 (<math>\approx</math> 0.030) OUR ESTIMATE</b>			

0.005±0.004	<sup>1</sup> HUNT	19	DPWA Multichannel
0.033±0.003	ANISOVICH	17E	DPWA Multichannel

$0.026 \pm 0.004$	<sup>1</sup> CHEN	12A	DPWA	$\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$0.034 \pm 0.006$	ANISOVICH	13B	DPWA	Multichannel
$0.029 \pm 0.002$	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
0.028	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

<sup>1</sup>Statistical error only. **$N(1680) \rightarrow n\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

VALUE (GeV <sup>-1/2</sup> )	DOCUMENT ID	TECN	COMMENT
<b>–0.050 to –0.025 (<math>\approx</math> –0.035) OUR ESTIMATE</b>			
$-0.061 \pm 0.004$	<sup>1</sup> HUNT	19	DPWA Multichannel
$-0.063 \pm 0.004$	ANISOVICH	17E	DPWA Multichannel
$-0.029 \pm 0.002$	<sup>1</sup> CHEN	12A	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.044 \pm 0.009$	ANISOVICH	13B	DPWA Multichannel
$-0.059 \pm 0.002$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
–0.038	DRECHSEL	07	DPWA $\gamma N \rightarrow \pi N$

<sup>1</sup>Statistical error only. **$N(1680)$  REFERENCES**

For early references, see Physics Letters **111B** 1 (1982). For very early references, see Reviews of Modern Physics **37** 633 (1965).

SARANTSEV	25	PR C112 015202	A.V. Sarantsev <i>et al.</i>	(Bonn-Gatchina Collab.)
SEIFEN	25	EPJ A61 173	T. Seifen <i>et al.</i>	(CBELSA/TAPS Collab.)
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.)
GOLOVATCH	19	PL B788 371	E. Golovatch <i>et al.</i>	(CLAS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
ANISOVICH	17E	PR C96 055202	A.V. Anisovich <i>et al.</i>	(BONN, PNPI, JLAB+)
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.)
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)
CHEN	12A	PR C86 015206	W. Chen <i>et al.</i>	(DUKE, GWU, MSST, ITEP+)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
WORKMAN	12A	PR C86 015202	R. Workman <i>et al.</i>	(GWU)
BATINIC	10	PR C82 038203	M. Batinic <i>et al.</i>	(ZAGR)
THOMA	08	PL B659 87	U. Thoma <i>et al.</i>	(CB-ELSA Collab.)
DRECHSEL	07	EPJ A34 69	D. Drechsel, S.S. Kamalov, L. Tiator	(MAINZ, JINR)
DUGGER	07	PR C76 025211	M. Dugger <i>et al.</i>	(JLab CLAS Collab.)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
TIATOR	99	PR C60 035210	L. Tiator <i>et al.</i>	
HOEHLER	93	$\pi N$ Newsletter 9 1	G. Hohler	(KARL)
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