

**$N(1675) 5/2^-$**  $I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$  Status: \*\*\*\*Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014). **$N(1675)$  POLE POSITION****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1655 to 1665 (<math>\approx 1660</math>) OUR ESTIMATE</b>			
1655 $\pm$ 4	SOKHOYAN	15A	DPWA Multichannel
1654 $\pm$ 2	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
1660 $\pm$ 10	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1646	ROENCHEN	15A	DPWA Multichannel
1640	SHKLYAR	13	DPWA Multichannel
1654 $\pm$ 4	ANISOVICH	12A	DPWA Multichannel
1656	SHRESTHA	12A	DPWA Multichannel
1658 $\pm$ 9	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1657	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
1674	VRANA	00	DPWA Multichannel
1656	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.**-2xIMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>125 to 150 (<math>\approx 135</math>) OUR ESTIMATE</b>			
147 $\pm$ 5	SOKHOYAN	15A	DPWA Multichannel
125 $\pm$ 3 $\pm$ 1	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
140 $\pm$ 10	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
125	ROENCHEN	15A	DPWA Multichannel
108	SHKLYAR	13	DPWA Multichannel
151 $\pm$ 5	ANISOVICH	12A	DPWA Multichannel
128	SHRESTHA	12A	DPWA Multichannel
137 $\pm$ 7	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
139	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
120	VRANA	00	DPWA Multichannel
126	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$

<sup>1</sup> Fit to the amplitudes of HOEHLER 79. **$N(1675)$  ELASTIC POLE RESIDUE****MODULUS  $|r|$** 

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>23 to 33 (<math>\approx 28</math>) OUR ESTIMATE</b>			
28 $\pm$ 1	SOKHOYAN	15A	DPWA Multichannel
23 $\pm$ 1	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
31 $\pm$ 5	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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

24	ROENCHEN	15A	DPWA	Multichannel
20	SHKLYAR	13	DPWA	Multichannel
28 ± 1	ANISOVICH	12A	DPWA	Multichannel
25	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
27	ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
23	HOEHLER	93	ARGD	$\pi N \rightarrow \pi N$

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

### PHASE $\theta$

<u>VALUE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>−30 to −20 (≈ −25) OUR ESTIMATE</b>			
−24 ± 4	SOKHOYAN	15A	DPWA Multichannel
−25 ± 2	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
−30 ± 10	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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

−22	ROENCHEN	15A	DPWA	Multichannel
−49	SHKLYAR	13	DPWA	Multichannel
−26 ± 4	ANISOVICH	12A	DPWA	Multichannel
−16	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
−21	ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$
−22	HOEHLER	93	ARGD	$\pi N \rightarrow \pi N$

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

## N(1675) INELASTIC POLE RESIDUE

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

### Normalized residue in $N\pi \rightarrow N(1675) \rightarrow \Delta\pi, D\text{-wave}$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.33 ± 0.04	90 ± 15	SOKHOYAN	15A	DPWA Multichannel
0.33 ± 0.05	82 ± 10	ANISOVICH	12A	DPWA Multichannel

### Normalized residue in $N\pi \rightarrow N(1675) \rightarrow N\eta$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.044	−43	ROENCHEN	15A	DPWA Multichannel

### Normalized residue in $N\pi \rightarrow N(1675) \rightarrow \Lambda K$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.001	100	ROENCHEN	15A	DPWA Multichannel

### Normalized residue in $N\pi \rightarrow N(1675) \rightarrow \Sigma K$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.031	−175	ROENCHEN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1675) \rightarrow N\sigma$** 

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.13 \pm 0.03$	$125 \pm 20$	SOKHOYAN	15A DPWA	Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$0.15 \pm 0.04$	$132 \pm 18$	ANISOVICH	12A DPWA	Multichannel

 **$N(1675)$  BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1665 to 1680 (<math>\approx 1675</math>) OUR ESTIMATE</b>			
$1663 \pm 4$	SOKHOYAN	15A DPWA	Multichannel
$1666 \pm 2$	<sup>1</sup> SHKLYAR	13 DPWA	Multichannel
$1679 \pm 1$	<sup>1</sup> SHRESTHA	12A DPWA	Multichannel
$1674.1 \pm 0.2$	<sup>1</sup> ARNDT	06 DPWA	$\pi N \rightarrow \pi N, \eta N$
$1675 \pm 10$	CUTKOSKY	80 IPWA	$\pi N \rightarrow \pi N$
$1679 \pm 8$	HOEHLER	79 IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$1664 \pm 5$	ANISOVICH	12A DPWA	Multichannel
$1679 \pm 9$	BATINIC	10 DPWA	$\pi N \rightarrow N\pi, N\eta$
$1685 \pm 4$	VRANA	00 DPWA	Multichannel

<sup>1</sup>Statistical error only. **$N(1675)$  BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>130 to 160 (<math>\approx 145</math>) OUR ESTIMATE</b>			
$146 \pm 6$	SOKHOYAN	15A DPWA	Multichannel
$148 \pm 1$	<sup>1</sup> SHKLYAR	13 DPWA	Multichannel
$145 \pm 4$	<sup>1</sup> SHRESTHA	12A DPWA	Multichannel
$146.5 \pm 1.0$	<sup>1</sup> ARNDT	06 DPWA	$\pi N \rightarrow \pi N, \eta N$
$160 \pm 20$	CUTKOSKY	80 IPWA	$\pi N \rightarrow \pi N$
$120 \pm 15$	HOEHLER	79 IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$152 \pm 7$	ANISOVICH	12A DPWA	Multichannel
$152 \pm 8$	BATINIC	10 DPWA	$\pi N \rightarrow N\pi, N\eta$
$131 \pm 10$	VRANA	00 DPWA	Multichannel

<sup>1</sup>Statistical error only. **$N(1675)$  DECAY MODES**

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

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\pi$	38–42 %
$\Gamma_2$ $N\eta$	< 1 %
$\Gamma_3$ $N\pi\pi$	25–45 %
$\Gamma_4$ $\Delta(1232)\pi$	
$\Gamma_5$ $\Delta(1232)\pi, D\text{-wave}$	23–37 %

$\Gamma_6$	$N\sigma$	3–7 %
$\Gamma_7$	$p\gamma$	0–0.02 %
$\Gamma_8$	$p\gamma$ , helicity=1/2	0–0.01 %
$\Gamma_9$	$p\gamma$ , helicity=3/2	0–0.01 %
$\Gamma_{10}$	$n\gamma$	0–0.15 %
$\Gamma_{11}$	$n\gamma$ , helicity=1/2	0–0.05 %
$\Gamma_{12}$	$n\gamma$ , helicity=3/2	0–0.10 %

### $N(1675)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$					$\Gamma_1/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
<b>38 to 42 (<math>\approx 40</math>) OUR ESTIMATE</b>					
41 $\pm 2$	SOKHOYAN	15A	DPWA	Multichannel	
41 $\pm 1$	<sup>1</sup> SHKLYAR	13	DPWA	Multichannel	
38.6 $\pm$ 0.6	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel	
39.3 $\pm$ 0.1	<sup>1</sup> ARNDT	06	DPWA	$\pi N \rightarrow \pi N, \eta N$	
38 $\pm 5$	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$	
38 $\pm 3$	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
40 $\pm 3$	ANISOVICH	12A	DPWA	Multichannel	
35 $\pm 4$	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$	
35 $\pm 1$	VRANA	00	DPWA	Multichannel	

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

$\Gamma(N\eta)/\Gamma_{\text{total}}$					$\Gamma_2/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
<1	SHKLYAR	13	DPWA	Multichannel	
<1	SHRESTHA	12A	DPWA	Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.1 $\pm$ 0.1	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$	
3 $\pm 3$	THOMA	08	DPWA	Multichannel	
0 $\pm 1$	VRANA	00	DPWA	Multichannel	

$\Gamma(\Delta(1232)\pi, D\text{-wave})/\Gamma_{\text{total}}$					$\Gamma_5/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
30 $\pm$ 7	SOKHOYAN	15A	DPWA	Multichannel	
46 $\pm$ 1	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
33 $\pm$ 8	ANISOVICH	12A	DPWA	Multichannel	
63 $\pm$ 2	VRANA	00	DPWA	Multichannel	

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

$\Gamma(N\sigma)/\Gamma_{\text{total}}$  $\Gamma_6/\Gamma$ 

VALUE (%)	DOCUMENT ID	TECN	COMMENT
5±2	SOKHOYAN 15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
7±3	ANISOVICH 12A	DPWA	Multichannel

 **$N(1675)$  PHOTON DECAY AMPLITUDES AT THE POLE** **$N(1675) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

MODULUS ( $\text{GeV}^{-1/2}$ )	PHASE ( $^\circ$ )	DOCUMENT ID	TECN	COMMENT
0.022±0.003	-12 ± 7	SOKHOYAN 15A	DPWA	Multichannel
0.022 <sup>+0.004</sup> <sub>-0.007</sub>	49 <sup>+5</sup> <sub>-2</sub>	ROENCHEN 14	DPWA	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.032	36	ROENCHEN 15A	DPWA	Multichannel

 **$N(1675) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

MODULUS ( $\text{GeV}^{-1/2}$ )	PHASE ( $^\circ$ )	DOCUMENT ID	TECN	COMMENT
0.028±0.006	-17 ± 6	SOKHOYAN 15A	DPWA	Multichannel
0.036 <sup>+0.004</sup> <sub>-0.005</sub>	-30 ± 4	ROENCHEN 14	DPWA	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.051	-9.3	ROENCHEN 15A	DPWA	Multichannel

 **$N(1675)$  BREIT-WIGNER PHOTON DECAY AMPLITUDES** **$N(1675) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.010 to 0.025 (<math>\approx 0.018</math>) OUR ESTIMATE</b>			
0.022±0.003	SOKHOYAN 15A	DPWA	Multichannel
0.009±0.001	<sup>1</sup> SHKLYAR 13	DPWA	Multichannel
0.013±0.001	<sup>1</sup> WORKMAN 12A	DPWA	$\gamma N \rightarrow N\pi$
0.018±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. • • •			
0.024±0.003	ANISOVICH 12A	DPWA	Multichannel
0.011±0.001	<sup>1</sup> SHRESTHA 12A	DPWA	Multichannel
0.015	DRECHSEL 07	DPWA	$\gamma N \rightarrow \pi N$

<sup>1</sup>Statistical error only. **$N(1675) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
<b>0.015 to 0.030 (<math>\approx 0.022</math>) OUR ESTIMATE</b>			
0.027±0.006	SOKHOYAN 15A	DPWA	Multichannel
0.021±0.001	<sup>1</sup> SHKLYAR 13	DPWA	Multichannel
0.016±0.001	<sup>1</sup> WORKMAN 12A	DPWA	$\gamma N \rightarrow N\pi$
0.021±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. • • •

0.025±0.007	ANISOVICH	12A	DPWA	Multichannel
0.020±0.001	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
0.022	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

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

### $N(1675) \rightarrow n\gamma$ , helicity-1/2 amplitude $A_{1/2}$

VALUE (GeV <sup>-1/2</sup> )	DOCUMENT ID	TECN	COMMENT
<b>−0.065 to −0.055 (≈ −0.060) OUR ESTIMATE</b>			

−0.060±0.007	ANISOVICH	13B	DPWA	Multichannel
−0.058±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. • • •

−0.040±0.004	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
−0.062	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

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

### $N(1675) \rightarrow n\gamma$ , helicity-3/2 amplitude $A_{3/2}$

VALUE (GeV <sup>-1/2</sup> )	DOCUMENT ID	TECN	COMMENT
<b>−0.095 to −0.075 (≈ −0.085) OUR ESTIMATE</b>			

−0.088±0.010	ANISOVICH	13B	DPWA	Multichannel
−0.080±0.005	<sup>1</sup> CHEN	12A	DPWA	$\gamma N \rightarrow \pi N$

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

−0.068±0.004	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel
−0.084	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

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

## $N(1675)$ REFERENCES

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

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.)
ROENCHEN	14	EPJ A50 101	D. Roenchen <i>et al.</i>	
Also		EPJ A51 63 (errat.)	D. Roenchen <i>et al.</i>	
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)
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