$N(1675)\ 5/2^-$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$ Status: ****

Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014).

N(1675) POLE POSITION

REAL PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1655 to 1665 (≈ 1660) OUR ESTIMATE				
1655± 4	SOKHOYAN	15A	DPWA	Multichannel
1654± 2	[1] SVARC	14	L+P	$\pi N \to \pi N$
1657	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
1656	HOEHLER	93	ARGD	$\pi N \to \pi N$
1660±10	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1640	SHKLYAR	13	DPWA	Multichannel
1654± 4	ANISOVICH	12A	DPWA	Multichannel
1656	SHRESTHA	12A	DPWA	Multichannel
1658± 9	BATINIC	10	DPWA	$\pi N \to N\pi, N\eta$
1674	VRANA	00	DPWA	Multichannel

−2×IMAGINARY PART

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

N(1675) ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
27±5 OUR ESTIMATE				
28±1	SOKHOYAN	15A	DPWA	Multichannel
23±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
27	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
23	HOEHLER	93	ARGD	$\pi N \to \pi N$
31±5	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

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

20	SHKLYAR	13	DPWA	Multichannel
28±1	ANISOVICH	12A	DPWA	Multichannel
25	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

PHASE θ

VALUE (°)	DOCUMENT ID		TECN	COMMENT
−25± 6 OUR ESTIMATE				
−24± 4	SOKHOYAN	15A	DPWA	Multichannel
−25± 2	[1] SVARC	14	L+P	$\pi N \to \pi N$
−21	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
−22	HOEHLER	93	ARGD	$\pi N \to \pi N$
−30±10	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−49	SHKLYAR	13	DPWA	Multichannel
−26± 4	ANISOVICH	12A	DPWA	Multichannel
−16	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

N(1675) INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \to N(1675) \to \Delta\pi$, D-wave

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
33±4	90 ± 15	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
33±5	82 ± 10	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \to N(1675) \to N\sigma$

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
13±3	125 ± 20	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
15±4	132 ± 18	ANISOVICH	12A	DPWA	Multichannel

N(1675) BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1670 to 1680 (≈ 1675) OUR ESTIMATE				
1663 ± 4	SOKHOYAN	15A	DPWA	Multichannel
1666 ± 2	SHKLYAR	13	DPWA	Multichannel
1674.1± 0.2	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
1675 ±10	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
1679 ± 8	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1664 ± 5	ANISOVICH	12A	DPWA	Multichannel
1679 ± 1	SHRESTHA	12A	DPWA	Multichannel
1679 ± 9	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
1685 ± 4	VRANA	00	DPWA	Multichannel

N(1675) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
130 to 165 (≈ 150) OUR ESTIMATE				
146 ± 6	SOKHOYAN	15A	DPWA	Multichannel
148 ± 1	SHKLYAR	13	DPWA	Multichannel
146.5± 1.0	ARNDT	06	DPWA	$\pi N \rightarrow \pi N$, ηN
160 ±20	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. • • •				
152 ± 7	ANISOVICH	12A	DPWA	Multichannel
145 ± 4	SHRESTHA	12A	DPWA	Multichannel
152 ± 8	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$
131 ±10	VRANA	00	DPWA	Multichannel

N(1675) DECAY MODES

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

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	35–45 %
Γ_2	$N\eta$	< 1 %
Γ_3	$N\pi\pi$	25–45 %
Γ_4	$\Delta(1232)\pi$	
Γ_5	$\Delta(1232)\pi$, D-wave	23–37 %
Γ_6	$N\sigma$	3–7 %
Γ_7	$p\gamma$	0–0.02 %
Γ_8	$p\gamma$, helicity=1/2	0–0.01 %
Γ_9	$p\gamma$, helicity=3/2	0–0.01 %
Γ_{10}	$n\gamma$	0–0.15 %
Γ_{11}	$n\gamma$, helicity=1/2	0–0.05 %
Γ_{12}	$n\gamma$, helicity=3/2	0–0.10 %

N(1675) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$ Γ_1/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
35 to 45 OUR ESTIMATE				
41 ±2	SOKHOYAN	15A	DPWA	Multichannel
41 ±1	SHKLYAR	13	DPWA	Multichannel
39.3±0.1	ARNDT	06	DPWA	$\pi N \rightarrow \pi N$, ηN
38 ±5	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
38 ±3	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
40 ±3	ANISOVICH	12A	DPWA	Multichannel
38.6±0.6	SHRESTHA	12A	DPWA	Multichannel
35 ±4	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$
35 ±1	VRANA	00	DPWA	Multichannel

$\Gamma(N\eta)/\Gamma_{total}$ Γ_2/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0 ±1	SHKLYAR	13	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1	SHRESTHA	12A	DPWA	Multichannel
0.1±0.1	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
3 ±3	THOMA	08	DPWA	Multichannel
0 ±1	VRANA	00	DPWA	Multichannel

$\Gamma(\Delta(1232)\pi$, D-wave$)/\Gamma_{total}$ Γ_5/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
30±7	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
33±8	ANISOVICH	12A	DPWA	Multichannel
46±1	SHRESTHA	12A	DPWA	Multichannel
63±2	VRANA	00	DPWA	Multichannel

$\Gamma(N\sigma)/\Gamma_{total}$ Γ_6/Γ

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

$N(1675) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.022±0.003	−12 ± 7	SOKHOYAN	15A	DPWA	Multichannel
$0.022^{+0.004}_{-0.007}$	49^{+5}_{-2}	ROENCHEN	14	DPWA	

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

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.028±0.006	−17 ± 6	SOKHOYAN	15A	DPWA	Multichannel
$0.036^{+0.004}_{-0.005}$	−30 ± 4	ROENCHEN	14	DPWA	

$N(1675)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

$N(1675) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
+0.019±0.008 OUR ESTIMATE				
0.022±0.003	SOKHOYAN	15A	DPWA	Multichannel
0.013±0.001	WORKMAN	12A	DPWA	$\gamma N \to N\pi$
0.018±0.002	DUGGER	07	DPWA	$\gamma N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.009±0.001	SHKLYAR	13	DPWA	Multichannel
0.024±0.003	ANISOVICH	12A	DPWA	Multichannel
0.011±0.001	SHRESTHA	12A	DPWA	Multichannel
0.015	DRECHSEL	07	DPWA	$\gamma N \to \pi N$

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

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
+0.020±0.005 OUR ESTIMATE				
0.027±0.006	SOKHOYAN	15A	DPWA	Multichannel
0.016±0.001	WORKMAN	12A	DPWA	$\gamma N \rightarrow N\pi$
0.021±0.001	DUGGER	07	DPWA	$\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.021±0.001	SHKLYAR	13	DPWA	Multichannel
0.025±0.007	ANISOVICH	12A	DPWA	Multichannel
0.020±0.001	SHRESTHA	12A	DPWA	Multichannel
0.022	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

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

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.060±0.005 OUR ESTIMATE				
−0.060±0.007	ANISOVICH	13B	DPWA	Multichannel
−0.058±0.002	CHEN	12A	DPWA	$\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.040±0.004	SHRESTHA	12A	DPWA	Multichannel
−0.062	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

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

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.085±0.010 OUR ESTIMATE				
−0.088±0.010	ANISOVICH	13B	DPWA	Multichannel
−0.080±0.005	CHEN	12A	DPWA	$\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.068±0.004	SHRESTHA	12A	DPWA	Multichannel
−0.084	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$

N(1675) FOOTNOTES

[1] Fit to the amplitudes of HOEHLER 79.

N(1675) REFERENCES

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

SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan *et al.*	(CBELSA/TAPS Collab.)
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)
ROENCHEN	14	EPJ A50 101	D. Roenchen *et al.*	
Also		EPJ A51 63 (errat.)	D. Roenchen *et al.*	
SVARC	14	PR C89 045205	A. Svarc *et al.*	
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich *et al.*	
SHKLYAR	13	PR C87 015201	V. Shklyar, H. Lenske, U. Mosel	(GIES)
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)
CHEN	12A	PR C86 015206	W. Chen *et al.*	(DUKE, GWU, MSST, ITEP+)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
WORKMAN	12A	PR C86 015202	R. Workman *et al.*	(GWU)
BATINIC	10	PR C82 038203	M. Batinic *et al.*	(ZAGR)
THOMA	08	PL B659 87	U. Thoma *et al.*	(CB-ELSA Collab.)
DRECHSEL	07	EPJ A34 69	D. Drechsel, S.S. Kamalov, L. Tiator	(MAINZ, JINR)
DUGGER	07	PR C76 025211	M. Dugger *et al.*	(JLab CLAS Collab.)

ARNDT	06	PR C74 045205	R.A. Arndt *et al.*	(GWU)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky *et al.*	(CMU, LBL) IJP
Also		PR D20 2839	R.E. Cutkosky *et al.*	(CMU, LBL) IJP
HOEHLER	79	PDAT 12-1	G. Hohler *et al.*	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP