

$$N(1700) \ 3/2^-$$

$$I(J^P) = \frac{1}{2}(\frac{3}{2}^-) \text{ Status: } ***$$

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

$N(1700)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1650 to 1750 (≈ 1700) OUR ESTIMATE			
1780 $\pm$ 35	SOKHOYAN	15A	DPWA Multichannel
1757 $\pm$ 4 $\pm$ 1	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
1660 $\pm$ 30	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1647	HUNT	19	DPWA Multichannel
1770 $\pm$ 40	ANISOVICH	12A	DPWA Multichannel
1806 $\pm$ 23	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1704	VRANA	00	DPWA Multichannel
1700	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

–2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
100 to 300 (≈ 200) OUR ESTIMATE			
420 $\pm$ 140	SOKHOYAN	15A	DPWA Multichannel
136 $\pm$ 7 $\pm$ 4	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
90 $\pm$ 40	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
79	HUNT	19	DPWA Multichannel
420 $\pm$ 180	ANISOVICH	12A	DPWA Multichannel
129 $\pm$ 33	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
156	VRANA	00	DPWA Multichannel
120	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

$N(1700)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
5 to 50 (≈ 10) OUR ESTIMATE			
60 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel
7 $\pm$ 1 $\pm$ 1	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
6 $\pm$ 3	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
50 $\pm$ 40	ANISOVICH	12A	DPWA Multichannel
7	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
5	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

PHASE θ

VALUE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
–120 to 0 ($\approx$ – 90) OUR ESTIMATE			
–115 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel
–113 $\pm$ 4 $\pm$ 2	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
0 $\pm$ 50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
–100 $\pm$ 40	ANISOVICH	12A	DPWA Multichannel
– 34	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
¹ Fit to the amplitudes of HOEHLER 79.			

 $N(1700)$ INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \rightarrow N(1700) \rightarrow \Delta\pi$, S-wave

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.33 $\pm$ 0.10	–70 $\pm$ 25	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.34 $\pm$ 0.21	–60 $\pm$ 40	ANISOVICH	12A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow N(1700) \rightarrow \Delta\pi$, D-wave

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.10 $\pm$ 0.06	75 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.08 $\pm$ 0.06	90 $\pm$ 35	ANISOVICH	12A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow N(1700) \rightarrow N\sigma$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.13 $\pm$ 0.08	–100 $\pm$ 35	SOKHOYAN	15A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow N(1700) \rightarrow N(1440)\pi$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.13 $\pm$ 0.05	40 $\pm$ 35	SOKHOYAN	15A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow N(1700) \rightarrow N(1520)\pi$, P-wave

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.07 $\pm$ 0.03	160 $\pm$ 45	SOKHOYAN	15A	DPWA Multichannel

 $N(1700)$ BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1650 to 1800 ($\approx$ 1720) OUR ESTIMATE			
1653 $\pm$ 5	¹ HUNT	19	DPWA Multichannel
1800 $\pm$ 35	SOKHOYAN	15A	DPWA Multichannel
1675 $\pm$ 25	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
1731 $\pm$ 15	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1790 $\pm$ 40	ANISOVICH	12A	DPWA Multichannel

1665± 3	¹ SHRESTHA	12A	DPWA	Multichannel
1817±22	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$
1736±33	VRANA	00	DPWA	Multichannel
¹ Statistical error only.				

***N*(1700) BREIT-WIGNER WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
100 to 300 (≈ 200) OUR ESTIMATE			
81± 13	¹ HUNT	19	DPWA Multichannel
400±100	SOKHOYAN	15A	DPWA Multichannel
90± 40	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
110± 30	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
390±140	ANISOVICH	12A	DPWA Multichannel
56± 8	¹ SHRESTHA	12A	DPWA Multichannel
134± 37	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
175±133	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

***N*(1700) DECAY MODES**

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

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	7–17 %
Γ_2 $N\eta$	1–2 %
Γ_3 $N\omega$	10–34 %
Γ_4 ΛK	1–2 %
Γ_5 $N\pi\pi$	>89 %
Γ_6 $\Delta(1232)\pi$	55–85 %
Γ_7 $\Delta(1232)\pi$, <i>S</i> -wave	50–80 %
Γ_8 $\Delta(1232)\pi$, <i>D</i> -wave	4–14 %
Γ_9 $N\rho$, <i>S</i> =3/2, <i>S</i> -wave	32–44 %
Γ_{10} $N\sigma$	2–14 %
Γ_{11} $N(1440)\pi$	3–11 %
Γ_{12} $N(1520)\pi$	<4 %
Γ_{13} $p\gamma$	0.01–0.05 %
Γ_{14} $p\gamma$, helicity=1/2	0.0–0.024 %
Γ_{15} $p\gamma$, helicity=3/2	0.002–0.026 %
Γ_{16} $n\gamma$	0.01–0.13 %
Γ_{17} $n\gamma$, helicity=1/2	0.0–0.09 %
Γ_{18} $n\gamma$, helicity=3/2	0.01–0.05 %

$N(1700)$ BRANCHING RATIOS **$\Gamma(N\pi)/\Gamma_{\text{total}}$** **$\Gamma_1/\Gamma$**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
7 to 17 (≈ 12) OUR ESTIMATE			
3.7 ± 0.1	¹ HUNT	19	DPWA Multichannel
15 ± 6	SOKHOYAN	15A	DPWA Multichannel
11 ± 5	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
8 ± 3	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
12 ± 5	ANISOVICH	12A	DPWA Multichannel
2.8 ± 0.5	¹ SHRESTHA	12A	DPWA Multichannel
9 ± 6	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
4 ± 2	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

 $\Gamma(N\eta)/\Gamma_{\text{total}}$ **Γ_2/Γ**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
1-2 % OUR ESTIMATE			
1 ± 1	MUELLER	20	DPWA Multichannel
1.1 ± 0.6	¹ HUNT	19	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
14 ± 5	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
10 ± 5	THOMA	08	DPWA Multichannel
0 ± 1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

 $\Gamma(N\omega)/\Gamma_{\text{total}}$ **Γ_3/Γ**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
22 ± 12	DENISENKO	16	DPWA Multichannel

 $\Gamma(\Lambda K)/\Gamma_{\text{total}}$ **Γ_4/Γ**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
1-2 % OUR ESTIMATE			
1.3 ± 0.7	¹ HUNT	19	DPWA Multichannel
¹ Statistical error only.			

 $\Gamma(\Delta(1232)\pi, S\text{-wave})/\Gamma_{\text{total}}$ **Γ_7/Γ**

VALUE (%)	DOCUMENT ID	TECN	COMMENT
11 ± 8	¹ HUNT	19	DPWA Multichannel
65 ± 15	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
72 ± 23	ANISOVICH	12A	DPWA Multichannel
31 ± 9	¹ SHRESTHA	12A	DPWA Multichannel
11 ± 1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

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

Γ_8/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
13 ± 5	¹ HUNT 19	DPWA	Multichannel
9 ± 5	SOKHOYAN 15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<10	ANISOVICH 12A	DPWA	Multichannel
3 ± 2	¹ SHRESTHA 12A	DPWA	Multichannel
79 ± 56	VRANA 00	DPWA	Multichannel
¹ Statistical error only.			

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

Γ_9/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
7.5 ± 3.6	¹ HUNT 19	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
38 ± 6	¹ SHRESTHA 12A	DPWA	Multichannel
7 ± 1	VRANA 00	DPWA	Multichannel
¹ Statistical error only.			

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

Γ_{10}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
62 ± 9	¹ HUNT 19	DPWA	Multichannel
8 ± 6	SOKHOYAN 15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
24 ± 6	¹ SHRESTHA 12A	DPWA	Multichannel
18 ± 12	THOMA 08	DPWA	Multichannel
0 ± 1	VRANA 00	DPWA	Multichannel
¹ Statistical error only.			

$\Gamma(N(1440)\pi)/\Gamma_{\text{total}}$

Γ_{11}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
7 ± 4	SOKHOYAN 15A	DPWA	Multichannel

$\Gamma(N(1520)\pi)/\Gamma_{\text{total}}$

Γ_{12}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<4	SOKHOYAN 15A	DPWA	Multichannel

$N(1700)$ PHOTON DECAY AMPLITUDES AT THE POLE

$N(1700) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

MODULUS ($\text{GeV}^{-1/2}$)	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.047 ± 0.016	75 ± 30	SOKHOYAN 15A	DPWA	Multichannel

$N(1700) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

MODULUS ($\text{GeV}^{-1/2}$)	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
-0.041 ± 0.014	0 ± 20	SOKHOYAN 15A	DPWA	Multichannel

$N(1700)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES **$N(1700) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$**

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
0.032 ± 0.005	¹ HUNT 19	DPWA	Multichannel
0.041 ± 0.017	ANISOVICH 12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.021 ± 0.005	¹ SHRESTHA 12A	DPWA	Multichannel
¹ Statistical error only.			

 $N(1700) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
0.034 ± 0.006	¹ HUNT 19	DPWA	Multichannel
-0.037 ± 0.014	SOKHOYAN 15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.034 ± 0.013	ANISOVICH 12A	DPWA	Multichannel
0.050 ± 0.009	¹ SHRESTHA 12A	DPWA	Multichannel
¹ Statistical error only.			

 $N(1700) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
0.005 ± 0.011	¹ HUNT 19	DPWA	Multichannel
0.025 ± 0.010	ANISOVICH 13B	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.049 ± 0.008	¹ SHRESTHA 12A	DPWA	Multichannel
¹ Statistical error only.			

 $N(1700) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
-0.094 ± 0.017	¹ HUNT 19	DPWA	Multichannel
-0.032 ± 0.018	ANISOVICH 13B	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.092 ± 0.014	¹ SHRESTHA 12A	DPWA	Multichannel
¹ Statistical error only.			

 $N(1700)$ REFERENCESFor early references, see Physics Letters **111B** 1 (1982).

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	
DENISENKO	16	PL B755 97	I. Denisenko <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>	
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)
THOMA	08	PL B659 87	U. Thoma <i>et al.</i>	(CB-ELSA Collab.)
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 <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
