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

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$ 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±35	SOKHOYAN	15A	DPWA	Multichannel
1757± 4±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
1660±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1647	HUNT	19	DPWA	Multichannel
1770±40	ANISOVICH	12A	DPWA	Multichannel
1806±23	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
1704	VRANA	00	DPWA	Multichannel
1700	HOEHLER	93	SPED	$\pi N \to \pi N$

[1] Fit to the amplitudes of HOEHLER 79.

−2×IMAGINARY PART

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

[1] Fit 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±30	SOKHOYAN	15A	DPWA	Multichannel
7± 1±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
6± 3	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
50±40	ANISOVICH	12A	DPWA	Multichannel
7	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
5	HOEHLER	93	SPED	$\pi N \to \pi N$

[1] Fit to the amplitudes of HOEHLER 79.

PHASE θ

VALUE (°)	DOCUMENT ID		TECN	COMMENT
−120 to 0 (≈ − 90) OUR ESTIMATE				
−115±30	SOKHOYAN	15A	DPWA	Multichannel
−113± 4±2	[1] SVARC	14	L+P	$\pi N \rightarrow \pi N$
0±50	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−100±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 (°)	DOCUMENT ID		TECN	COMMENT
0.33±0.10	−70 ± 25	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.34±0.21	−60 ± 40	ANISOVICH	12A	DPWA	Multichannel

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

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

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

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.13±0.08	−100 ± 35	SOKHOYAN	15A	DPWA	Multichannel

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

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.13±0.05	40 ± 35	SOKHOYAN	15A	DPWA	Multichannel

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

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.07±0.03	160 ± 45	SOKHOYAN	15A	DPWA	Multichannel

$N(1700)$ BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1650 to 1800 (≈ 1720) OUR ESTIMATE				
1653± 5	[1] HUNT	19	DPWA	Multichannel
1800±35	SOKHOYAN	15A	DPWA	Multichannel
1675±25	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
1731±15	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$

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

1790±40	ANISOVICH	12A	DPWA	Multichannel
1665± 3	[1] SHRESTHA	12A	DPWA	Multichannel
1817±22	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
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	$\pi N \to \pi N$
110± 30	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • 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	$\pi N \to N\pi$, $N\eta$
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	$\Delta(1232)\pi$, S-wave	50–80 %
Γ_8	$\Delta(1232)\pi$, D-wave	4–14 %
Γ_9	$N\rho$, S=3/2, S-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

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

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	$\pi N \to \pi N$
8 ±3	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • 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	$\pi N \to N\pi$, $N\eta$
4 ±2	VRANA	00	DPWA	Multichannel

[1] Statistical error only.

$\Gamma(N\eta)/\Gamma_{total}$ — 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	$\pi N \to N\pi$, $N\eta$
10 ±5	THOMA	08	DPWA	Multichannel
0 ±1	VRANA	00	DPWA	Multichannel

[1] Statistical error only.

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

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

$\Gamma(\Lambda K)/\Gamma_{total}$ — 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.

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

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

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

$\Gamma(N\sigma)/\Gamma_{total}$ — 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.

$\Gamma(N(1440)\pi)/\Gamma_{total}$ — Γ_{11}/Γ

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

$\Gamma(N(1520)\pi)/\Gamma_{total}$ — Γ_{12}/Γ

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

N(1700) PHOTON DECAY AMPLITUDES AT THE POLE

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

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

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

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

N(1700) BREIT-WIGNER PHOTON DECAY AMPLITUDES

N(1700) → $p\gamma$, 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) → $p\gamma$, 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) → $n\gamma$, 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) → $n\gamma$, 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) REFERENCES

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

MUELLER	20	PL B803 135323	J. Mueller *et al.*	(CBELSA/TAPS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
DENISENKO	16	PL B755 97	I. Denisenko *et al.*	
SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan *et al.*	(CBELSA/TAPS Collab.)
PDG	14	CP C38 070001	K. Olive *et al.*	(PDG Collab.)
SVARC	14	PR C89 045205	A. Svarc *et al.*	(RBI Zagreb, UNI Tuzla)
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich *et al.*	
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
BATINIC	10	PR C82 038203	M. Batinic *et al.*	(ZAGR)

THOMA	08	PL B659 87	U. Thoma *et al.*	(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 *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