$N(1990)\ 7/2^+$

$I(J^P) = \frac{1}{2}(\frac{7}{2}^+)$ Status: **

OMITTED FROM SUMMARY TABLE

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

N(1990) POLE POSITION

REAL PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2030±65	ANISOVICH	12A	DPWA	Multichannel
1900±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1738	ROENCHEN	15A	DPWA	Multichannel
1941	SHRESTHA	12A	DPWA	Multichannel
2301	VRANA	00	DPWA	Multichannel

−2×IMAGINARY PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
240±60	ANISOVICH	12A	DPWA	Multichannel
260±60	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
188	ROENCHEN	15A	DPWA	Multichannel
130	SHRESTHA	12A	DPWA	Multichannel
202	VRANA	00	DPWA	Multichannel

N(1990) ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2 ±1	ANISOVICH	12A	DPWA	Multichannel
9 ±3	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.3	ROENCHEN	15A	DPWA	Multichannel

PHASE θ

VALUE (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
125±65	ANISOVICH	12A	DPWA	Multichannel
− 60±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
− 70	ROENCHEN	15A	DPWA	Multichannel

Δ(1990) INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \to N(1990) \to N\eta$

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.013	−82	ROENCHEN	15A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1990) \rightarrow \Lambda K$

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.022	−111	ROENCHEN	15A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1990) \rightarrow \Sigma K$

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.005	24	ROENCHEN	15A	DPWA	Multichannel

$N(1990)$ BREIT-WIGNER MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1950 to 2100 (≈ 2020) OUR ESTIMATE				
2060 ± 65	ANISOVICH	12A	DPWA	Multichannel
1990 ± 45	[1] SHRESTHA	12A	DPWA	Multichannel
1970 ± 50	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
2005 ± 150	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2311 ± 16	VRANA	00	DPWA	Multichannel

[1] Statistical error only.

$N(1990)$ BREIT-WIGNER WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
200 to 400 (≈ 300) OUR ESTIMATE				
240 ± 50	ANISOVICH	12A	DPWA	Multichannel
203 ± 161	[1] SHRESTHA	12A	DPWA	Multichannel
350 ± 120	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
350 ± 100	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
205 ± 72	VRANA	00	DPWA	Multichannel

[1] Statistical error only.

$N(1990)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	2–6 %
Γ_2	$p\gamma$	0.01–0.12 %
Γ_3	$p\gamma$, helicity=1/2	0.003–0.042 %
Γ_4	$p\gamma$, helicity=3/2	0.009–0.075 %
Γ_5	$n\gamma$	0.01–0.16 %
Γ_6	$n\gamma$, helicity=1/2	0.003–0.066 %
Γ_7	$n\gamma$, helicity=3/2	0.003–0.098 %

N(1990) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$ Γ_1/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2 to 6 (≈ 4) OUR ESTIMATE				
2± 1	ANISOVICH	12A	DPWA	Multichannel
2± 1	[1] SHRESTHA	12A	DPWA	Multichannel
6± 2	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
4± 2	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
22±11	VRANA	00	DPWA	Multichannel

[1] Statistical error only.

N(1990) PHOTON DECAY AMPLITUDES AT THE POLE

N(1990) → *pγ*, helicity-1/2 amplitude $A_{1/2}$

MODULUS ($GeV^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
$0.010^{+0.011}_{-0.006}$	-103^{+108}_{-155}	ROENCHEN	14	DPWA	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.029	67	ROENCHEN	15A	DPWA	Multichannel

N(1990) → *pγ*, helicity-3/2 amplitude $A_{3/2}$

MODULUS ($GeV^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
$0.053^{+0.023}_{-0.028}$	36^{+17}_{-4}	ROENCHEN	14	DPWA	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.033	39	ROENCHEN	15A	DPWA	Multichannel

N(1990) BREIT-WIGNER PHOTON DECAY AMPLITUDES

N(1990) → *pγ*, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.040±0.012	ANISOVICH	12A	DPWA	Multichannel

N(1990) → *pγ*, helicity-3/2 amplitude $A_{3/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.057±0.012	ANISOVICH	12A	DPWA	Multichannel

N(1990) → *nγ*, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
−0.045±0.020	ANISOVICH	13B	DPWA	Multichannel

N(1990) → *nγ*, helicity-3/2 amplitude $A_{3/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
−0.052±0.027	ANISOVICH	13B	DPWA	Multichannel

N(1990) REFERENCES

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

ROENCHEN	15A	EPJ A51 70	D. Roenchen *et al.*	
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.*	
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)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
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