

**$N(1990) 7/2^+$**  $I(J^P) = \frac{1}{2}(7^+)$  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**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2030±65	ANISOVICH 12A	DPWA	Multichannel
1900±30	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● 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**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
240±60	ANISOVICH 12A	DPWA	Multichannel
260±60	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● 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  $|r|$** 

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

**PHASE  $\theta$** 

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

**$\Delta(1990)$  INELASTIC POLE RESIDUE**The “normalized residue” is the residue divided by  $\Gamma_{pole}/2$ .**Normalized residue in  $N\pi \rightarrow N(1990) \rightarrow N\eta$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.013	-82	ROENCHEN	15A DPWA	Multichannel

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

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.022	-111	ROENCHEN	15A DPWA	Multichannel

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

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.005	24	ROENCHEN	15A DPWA	Multichannel

 **$N(1990)$  BREIT-WIGNER MASS**

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

<sup>1</sup>Statistical error only. **$N(1990)$  BREIT-WIGNER WIDTH**

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

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

**$N(1990)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\pi$	2–6 %
$\Gamma_2$ $p\gamma$	0.01–0.12 %
$\Gamma_3$ $p\gamma$ , helicity=1/2	0.003–0.042 %
$\Gamma_4$ $p\gamma$ , helicity=3/2	0.009–0.075 %
$\Gamma_5$ $n\gamma$	0.01–0.16 %
$\Gamma_6$ $n\gamma$ , helicity=1/2	0.003–0.066 %
$\Gamma_7$ $n\gamma$ , helicity=3/2	0.003–0.098 %

 **$N(1990)$  BRANCHING RATIOS**

$\Gamma(N\pi)/\Gamma_{\text{total}}$					$\Gamma_1/\Gamma$
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
<b>2 to 6 (<math>\approx 4</math>) OUR ESTIMATE</b>					
$2 \pm 1$	ANISOVICH	12A	DPWA	Multichannel	
$2 \pm 1$	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel	
$6 \pm 2$	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$	
$4 \pm 2$	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$22 \pm 11$	VRANA	00	DPWA	Multichannel	
<sup>1</sup> Statistical error only.					

 **$N(1990)$  PHOTON DECAY AMPLITUDES AT THE POLE** **$N(1990) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

MODULUS ( $\text{GeV}^{-1/2}$ )	PHASE ( $^\circ$ )	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

 **$N(1990) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

MODULUS ( $\text{GeV}^{-1/2}$ )	PHASE ( $^\circ$ )	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** **$N(1990) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

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

**$N(1990) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$**

<u>VALUE (GeV<sup>-1/2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.057 ± 0.012	ANISOVICH 12A	DPWA	Multichannel

**$N(1990) \rightarrow n\gamma$ , helicity-1/2 amplitude  $A_{1/2}$**

<u>VALUE (GeV<sup>-1/2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-0.045 ± 0.020	ANISOVICH 13B	DPWA	Multichannel

**$N(1990) \rightarrow n\gamma$ , helicity-3/2 amplitude  $A_{3/2}$**

<u>VALUE (GeV<sup>-1/2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-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 <i>et al.</i>	
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>	
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)
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 <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