

**$N(1990) F_{17}$** 

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

**OMITTED FROM SUMMARY TABLE**

Most of the results published before 1975 are now obsolete and have been omitted. They may be found in our 1982 edition, Physics Letters **111B** (1982).

The various analyses do not agree very well with one another.

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

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>≈ 1990 OUR ESTIMATE</b>			
2086 ± 28	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$
2018	CRAWFORD	80	DPWA $\gamma N \rightarrow \pi N$
1970 ± 50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2005 ± 150	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
1999	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2311 ± 16	VRANA	00	Multichannel

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

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
535 ± 120	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$
295	CRAWFORD	80	DPWA $\gamma N \rightarrow \pi N$
350 ± 120	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
350 ± 100	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
216	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
205 ± 72	VRANA	00	Multichannel

 **$N(1990)$  POLE POSITION****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1900 ± 30	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2301	VRANA	00	Multichannel
not seen	ARNDT	91	DPWA $\pi N \rightarrow \pi N$ Soln SM90

**−2×IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
260 ± 60	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
202	VRANA	00	Multichannel
not seen	ARNDT	91	DPWA $\pi N \rightarrow \pi N$ Soln SM90

## N(1990) ELASTIC POLE RESIDUE

### MODULUS $|r|$

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
9±3	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

### PHASE $\theta$

<u>VALUE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-60±30	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

## N(1990) DECAY MODES

Mode	
$\Gamma_1$	$N\pi$
$\Gamma_2$	$N\eta$
$\Gamma_3$	$\Lambda K$
$\Gamma_4$	$\Sigma K$
$\Gamma_5$	$N\pi\pi$
$\Gamma_6$	$p\gamma$ , helicity=1/2
$\Gamma_7$	$p\gamma$ , helicity=3/2
$\Gamma_8$	$n\gamma$ , helicity=1/2
$\Gamma_9$	$n\gamma$ , helicity=3/2

## N(1990) BRANCHING RATIOS

<u><math>\Gamma(N\pi)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>\Gamma_1/\Gamma</math></u>
0.06±0.02	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$	
0.06±0.02	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$	
0.04±0.02	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.22±0.11	VRANA	00	Multichannel	

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow N\eta</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_2)^{1/2}/\Gamma</math></u>
-0.043	BAKER	79	DPWA $\pi^- p \rightarrow n\eta$	

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow \Lambda K</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_3)^{1/2}/\Gamma</math></u>
+0.01	BELL	83	DPWA $\pi^- p \rightarrow \Lambda K^0$	
not seen	SAXON	80	DPWA $\pi^- p \rightarrow \Lambda K^0$	
-0.021±0.033	DEVENISH	74B	Fixed- $t$ dispersion rel.	

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow N(1990) \rightarrow \Sigma K</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1\Gamma_4)^{1/2}/\Gamma</math></u>
0.010 to 0.023	<sup>1</sup> DEANS	75	DPWA $\pi N \rightarrow \Sigma K$	
0.06	LANGBEIN	73	IPWA $\pi N \rightarrow \Sigma K$ (sol. 1)	

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\pi \rightarrow N(1990) \rightarrow N\pi\pi$	$(\Gamma_1 \Gamma_5)^{1/2} / \Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
not seen	LONGACRE	75	IPWA $\pi N \rightarrow N\pi\pi$

### **$N(1990)$ PHOTON DECAY AMPLITUDES**

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

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
$0.030 \pm 0.029$	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
$0.001 \pm 0.040$	CRAWFORD	80	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.040	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

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

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
$0.086 \pm 0.060$	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
$0.004 \pm 0.025$	CRAWFORD	80	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
+0.004	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

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

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
-0.001	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
$-0.078 \pm 0.030$	CRAWFORD	80	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.069	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

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

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
-0.178	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$
$-0.116 \pm 0.045$	CRAWFORD	80	DPWA $\gamma N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-0.072	BARBOUR	78	DPWA $\gamma N \rightarrow \pi N$

### **$N(1990)$ FOOTNOTES**

<sup>1</sup> The range given for DEANS 75 is from the four best solutions.

## N(1990) REFERENCES

For early references, see Physics Letters **111B** 70 (1982).

VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman,, T.-S.H. Lee	
MANLEY	92	PR D45 4002	D.M. Manley, E.M. Saleski	(KENT) IJP
Also	84	PR D30 904	D.M. Manley <i>et al.</i>	(VPI)
ARNDT	91	PR D43 2131	R.A. Arndt <i>et al.</i>	(VPI, TELE) IJP
BELL	83	NP B222 389	K.W. Bell <i>et al.</i>	(RL) IJP
PDG	82	PL 111B	M. Roos <i>et al.</i>	(HELS, CIT, CERN)
AWAJI	81	Bonn Conf. 352	N. Awaji, R. Kajikawa	(NAGO)
Also	82	NP B197 365	K. Fujii <i>et al.</i>	(NAGO)
CRAWFORD	80	Toronto Conf. 107	R.L. Crawford	(GLAS)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
Also	79	PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
SAXON	80	NP B162 522	D.H. Saxon <i>et al.</i>	(RHEL, BRIS) IJP
BAKER	79	NP B156 93	R.D. Baker <i>et al.</i>	(RHEL) IJP
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also	80	Toronto Conf. 3	R. Koch	(KARLT) IJP
BARBOUR	78	NP B141 253	I.M. Barbour, R.L. Crawford, N.H. Parsons	(GLAS)
DEANS	75	NP B96 90	S.R. Deans <i>et al.</i>	(SFLA, ALAH) IJP
LONGACRE	75	PL 55B 415	R.S. Longacre <i>et al.</i>	(LBL, SLAC) IJP
DEVENISH	74B	NP B81 330	R.C.E. Devenish, C.D. Froggatt, B.R. Martin	(DESY+)
LANGBEIN	73	NP B53 251	W. Langbein, F. Wagner	(MUNI) IJP

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