# $N(1990)\ F_{17}$

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

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **≈ 1990 OUR ESTIMATE** | | | | |
| 2086 ± 28 | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| 2018 | CRAWFORD | 80 | DPWA | $\gamma N \to \pi N$ |
| 1970 ± 50 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 2005 ± 150 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| 1999 | BARBOUR | 78 | DPWA | $\gamma N \to \pi N$ |

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

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| 535 ± 120 | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| 295 | CRAWFORD | 80 | DPWA | $\gamma N \to \pi N$ |
| 350 ± 120 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 350 ± 100 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| 216 | BARBOUR | 78 | DPWA | $\gamma N \to \pi N$ |

## $N(1990)$ POLE POSITION

### REAL PART

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| 1900 ± 30 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| not seen | ARNDT | 91 | DPWA | $\pi N \to \pi N$ Soln SM90 |

### −2×IMAGINARY PART

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| 260 ± 60 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| not seen | ARNDT | 91 | DPWA | $\pi N \to \pi N$ Soln SM90 |

## $N(1990)$ ELASTIC POLE RESIDUE

### MODULUS $|r|$

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| 9 ± 3 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |

### PHASE $\theta$

| VALUE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-60 \pm 30$ | 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

### $\Gamma(N\pi)/\Gamma_{total}$ — $\Gamma_1/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $0.06 \pm 0.02$ | MANLEY | 92 | IPWA | $\pi N \rightarrow \pi N$ & $N \pi \pi$ |
| $0.06 \pm 0.02$ | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |
| $0.04 \pm 0.02$ | HOEHLER | 79 | IPWA | $\pi N \rightarrow \pi N$ |

### $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1990) \rightarrow N\eta$ — $(\Gamma_1 \Gamma_2)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.043$ | BAKER | 79 | DPWA | $\pi^- p \rightarrow n \eta$ |

### $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1990) \rightarrow \Lambda K$ — $(\Gamma_1 \Gamma_3)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $+0.01$ | BELL | 83 | DPWA | $\pi^- p \rightarrow \Lambda K^0$ |
| not seen | SAXON | 80 | DPWA | $\pi^- p \rightarrow \Lambda K^0$ |
| $-0.021 \pm 0.033$ | DEVENISH | 74B | | Fixed-$t$ dispersion rel. |

### $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1990) \rightarrow \Sigma K$ — $(\Gamma_1 \Gamma_4)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| 0.010 to 0.023 | [1] DEANS | 75 | DPWA | $\pi N \rightarrow \Sigma K$ |
| 0.06 | LANGBEIN | 73 | IPWA | $\pi N \rightarrow \Sigma K$ (sol. 1) |

### $(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{total}$ 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) → $p\gamma$, helicity-1/2 amplitude $A_{1/2}$

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

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

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

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

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

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

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

## *N*(1990) FOOTNOTES

[1] The range given for DEANS 75 is from the four best solutions.

## *N*(1990) REFERENCES

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


| | | | | |
|---|---|---|---|---|
| MANLEY | 92 | PR D45 4002 | D.M. Manley, E.M. Saleski | (KENT) IJP |
| Also | 84 | PR D30 904 | D.M. Manley *et al.* | (VPI) |
| ARNDT | 91 | PR D43 2131 | R.A. Arndt *et al.* | (VPI, TELE) IJP |
| BELL | 83 | NP B222 389 | K.W. Bell *et al.* | (RL) IJP |
| PDG | 82 | PL 111B | M. Roos *et al.* | (HELS, CIT, CERN) |
| AWAJI | 81 | Bonn Conf. 352 | N. Awaji, R. Kajikawa | (NAGO) |
| Also | 82 | NP B197 365 | K. Fujii *et al.* | (NAGO) |
| CRAWFORD | 80 | Toronto Conf. 107 | R.L. Crawford | (GLAS) |
| CUTKOSKY | 80 | Toronto Conf. 19 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP |
| Also | 79 | PR D20 2839 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP |
| SAXON | 80 | NP B162 522 | D.H. Saxon *et al.* | (RHEL, BRIS) IJP |

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|---|---|---|---|---|
| BAKER | 79 | NP B156 93 | R.D. Baker *et al.* | (RHEL) IJP |
| HOEHLER | 79 | PDAT 12-1 | G. Hohler *et al.* | (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 *et al.* | (SFLA, ALAH) IJP |
| LONGACRE | 75 | PL 55B 415 | R.S. Longacre *et al.* | (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 |