

N(1990) F₁₇

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

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** 1 (1982). Some further obsolete results published before 1984 were last included in our 2006 edition, *Journal of Physics, G* **33** 1 (2006).

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

The latest GWU analysis (ARNDT 06) finds no evidence for this resonance.

N(1990) BREIT-WIGNER MASS

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|------------------------|
| ≈ 1990 OUR ESTIMATE | | | |
| 2086 ± 28 | MANLEY | 92 | IPWA π N → π N & N π π |
| 1970 ± 50 | CUTKOSKY | 80 | IPWA π N → π N |
| 2005 ± 150 | HOEHLER | 79 | IPWA π N → π N |
| 1999 | BARBOUR | 78 | DPWA γ N → π N |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 2311 ± 16 | VRANA | 00 | DPWA 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 π N → π N & N π π |
| 350 ± 120 | CUTKOSKY | 80 | IPWA π N → π N |
| 350 ± 100 | HOEHLER | 79 | IPWA π N → π N |
| 216 | BARBOUR | 78 | DPWA γ N → π N |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 205 ± 72 | VRANA | 00 | DPWA 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 π N → π N |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 2301 | VRANA | 00 | DPWA Multichannel |
| not seen | ARNDT | 91 | DPWA π N → π 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 | DPWA 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 θ

| <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 |
|-------------------------------------|
| Γ_1 $N\pi$ |
| Γ_2 $N\eta$ |
| Γ_3 ΛK |
| Γ_4 ΣK |
| Γ_5 $N\pi\pi$ |
| Γ_6 $p\gamma$, helicity=1/2 |
| Γ_7 $p\gamma$, helicity=3/2 |
| Γ_8 $n\gamma$, helicity=1/2 |
| Γ_9 $n\gamma$, helicity=3/2 |

N(1990) BRANCHING RATIOS

| <u>$\Gamma(N\pi)/\Gamma_{\text{total}}$</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | <u>Γ_1/Γ</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 | DPWA Multichannel | |

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

| <u>$\Gamma(N\eta)/\Gamma_{\text{total}}$</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | <u>Γ_2/Γ</u> |
|---|--------------------|-------------|-------------------|-------------------------------------|
| 0.00±0.01 | VRANA | 00 | DPWA Multichannel | |

| $(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ 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 ± 0.033 | DEVENISH | 74B | | Fixed-t dispersion rel. |

| $(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ 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) |

| $(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ 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

Papers on γN amplitudes predating 1981 may be found in our 2006 edition, Journal of Physics, G **33** 1 (2006).

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

| VALUE ($\text{GeV}^{-1/2}$) | DOCUMENT ID | TECN | COMMENT |
|---|-------------|------|-----------------------------------|
| 0.030 ± 0.029 | AWAJI | 81 | 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 ± 0.060 | AWAJI | 81 | 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 $\gamma N \rightarrow \pi N$ |
| ● ● ● 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 $\gamma N \rightarrow \pi N$ |
| ● ● ● 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

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

N(1990) REFERENCES

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

| | | | | |
|----------|-----|------------------|---|--------------------|
| ARNDT | 06 | PR C74 045205 | R.A. Arndt <i>et al.</i> | (GWU) |
| PDG | 06 | JPG 33 1 | W.-M. Yao <i>et al.</i> | (PDG Collab.) |
| VRANA | 00 | PRPL 328 181 | T.P. Vrana, S.A. Dytman,, T.-S.H. Lee | (PITT+) |
| MANLEY | 92 | PR D45 4002 | D.M. Manley, E.M. Saleski | (KENT) IJP |
| Also | | 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 1 | M. Roos <i>et al.</i> | (HELSE, CIT, CERN) |
| AWAJI | 81 | Bonn Conf. 352 | N. Awaji, R. Kajikawa | (NAGO) |
| Also | | NP B197 365 | K. Fujii <i>et al.</i> | (NAGO) |
| 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 |
| 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 | | 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 |
