## $N(1675)$ BRANCHING RATIOS

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

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.4 to 0.5 OUR ESTIMATE** | | | | |
| $0.47\pm0.02$ | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| $0.38\pm0.05$ | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| $0.38\pm0.03$ | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to N\eta$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $-0.07$ | BAKER | 79 | DPWA | $\pi^- p \to n\eta$ |
| $+0.009$ | FELTESSE | 75 | DPWA | Soln A; see BAKER 79 |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to \Lambda K$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **$\pm$0.04 to $\pm$0.08 OUR ESTIMATE** | | | | |
| $-0.01$ | BELL | 83 | DPWA | $\pi^- p \to \Lambda K^0$ |
| $+0.036$ | [5] SAXON | 80 | DPWA | $\pi^- p \to \Lambda K^0$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $-0.034\pm0.006$ | DEVENISH | 74B | | Fixed-$t$ dispersion rel. |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to \Sigma K$ — $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $<0.003$ | [6] DEANS | 75 | DPWA | $\pi N \to \Sigma K$ |

Note: Signs of couplings from $\pi N \to N\pi\pi$ analyses were changed in the 1986 edition to agree with the baryon-first convention; the overall phase ambiguity is resolved by choosing a negative sign for the $\Delta(1620)$ $S_{31}$ coupling to $\Delta(1232)\pi$.

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to \Delta(1232)\pi$, $D$-wave — $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **+0.46 to +0.50 OUR ESTIMATE** | | | | |
| $+0.496\pm0.003$ | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| $+0.46$ | [1,7] LONGACRE | 77 | IPWA | $\pi N \to N\pi\pi$ |
| $+0.50$ | [2] LONGACRE | 75 | IPWA | $\pi N \to N\pi\pi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $+0.5$ | [8] NOVOSELLER | 78 | IPWA | $\pi N \to N\pi\pi$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to N\rho$, $S$=1/2, $D$-wave — $(\Gamma_1\Gamma_{10})^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $+0.04\pm0.02$ | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to N\rho$, $S$=3/2, $D$-wave — $(\Gamma_1\Gamma_{11})^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **$-$0.12 to $-$0.06 OUR ESTIMATE** | | | | |
| $-0.03\pm0.02$ | MANLEY | 92 | IPWA | $\pi N \to \pi N$ & $N\pi\pi$ |
| $-0.15$ | [1,7] LONGACRE | 77 | IPWA | $\pi N \to N\pi\pi$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1675) \to N(\pi\pi)^{I=0}_{S\text{-wave}}$ — $(\Gamma_1\Gamma_{13})^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $+0.03$ | [1,7] LONGACRE | 77 | IPWA | $\pi N \to N\pi\pi$ |

## $N(1675)$ PHOTON DECAY AMPLITUDES

### $N(1675) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

| VALUE (GeV$^{-1/2}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **+0.018$\pm$0.010 OUR ESTIMATE** | | | | |
| $0.012\pm0.002$ | LI | 93 | IPWA | $\gamma N \to \pi N$ |
| $0.021\pm0.011$ | CRAWFORD | 83 | IPWA | $\gamma N \to \pi N$ |
| $0.034\pm0.005$ | AWAJI | 81 | DPWA | $\gamma N \to \pi N$ |
| $0.006\pm0.005$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 1) |
| $0.006\pm0.004$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 2) |
| $0.023\pm0.015$ | CRAWFORD | 80 | DPWA | $\gamma N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $+0.022\pm0.010$ | BARBOUR | 78 | DPWA | $\gamma N \to \pi N$ |
| $+0.034\pm0.004$ | FELLER | 76 | DPWA | $\gamma N \to \pi N$ |

### $N(1675) \to p\gamma$, helicity-3/2 amplitude $A_{3/2}$

| VALUE (GeV$^{-1/2}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **+0.018$\pm$0.009 OUR ESTIMATE** | | | | |
| $0.021\pm0.002$ | LI | 93 | IPWA | $\gamma N \to \pi N$ |
| $0.015\pm0.009$ | CRAWFORD | 83 | IPWA | $\gamma N \to \pi N$ |
| $0.024\pm0.008$ | AWAJI | 81 | DPWA | $\gamma N \to \pi N$ |
| $0.030\pm0.004$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 1) |
| $0.029\pm0.004$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 2) |
| $0.003\pm0.012$ | CRAWFORD | 80 | DPWA | $\gamma N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $+0.015\pm0.006$ | BARBOUR | 78 | DPWA | $\gamma N \to \pi N$ |
| $+0.019\pm0.009$ | FELLER | 76 | DPWA | $\gamma N \to \pi N$ |

### $N(1675) \to n\gamma$, helicity-1/2 amplitude $A_{1/2}$

| VALUE (GeV$^{-1/2}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **$-$0.050$\pm$0.014 OUR ESTIMATE** | | | | |
| $-0.060\pm0.003$ | LI | 93 | IPWA | $\gamma N \to \pi N$ |
| $-0.057\pm0.024$ | AWAJI | 81 | DPWA | $\gamma N \to \pi N$ |
| $-0.033\pm0.004$ | FUJII | 81 | DPWA | $\gamma N \to \pi N$ |
| $-0.039\pm0.017$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 1) |
| $-0.025\pm0.027$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 2) |
| $-0.059\pm0.015$ | CRAWFORD | 80 | DPWA | $\gamma N \to \pi N$ |
| $-0.021\pm0.011$ | TAKEDA | 80 | DPWA | $\gamma N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $-0.066\pm0.020$ | BARBOUR | 78 | DPWA | $\gamma N \to \pi N$ |

### $N(1675) \to n\gamma$, helicity-3/2 amplitude $A_{3/2}$

| VALUE (GeV$^{-1/2}$) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **$-$0.070$\pm$0.006 OUR ESTIMATE** | | | | |
| $-0.074\pm0.003$ | LI | 93 | IPWA | $\gamma N \to \pi N$ |
| $-0.077\pm0.018$ | AWAJI | 81 | DPWA | $\gamma N \to \pi N$ |
| $-0.069\pm0.004$ | FUJII | 81 | DPWA | $\gamma N \to \pi N$ |
| $-0.066\pm0.026$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 1) |
| $-0.071\pm0.022$ | ARAI | 80 | DPWA | $\gamma N \to \pi N$ (fit 2) |
| $-0.059\pm0.020$ | CRAWFORD | 80 | DPWA | $\gamma N \to \pi N$ |
| $-0.030\pm0.012$ | TAKEDA | 80 | DPWA | $\gamma N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $-0.073\pm0.014$ | BARBOUR | 78 | DPWA | $\gamma N \to \pi N$ |

## $N(1675)$ FOOTNOTES

[1] LONGACRE 77 pole positions are from a search for poles in the unitarized T-matrix; the first (second) value uses, in addition to $\pi N \to N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis. The other LONGACRE 77 values are from eyeball fits with Breit-Wigner circles to the T-matrix amplitudes.

[2] From method II of LONGACRE 75: eyeball fits with Breit-Wigner circles to the T-matrix amplitudes.

[3] See HOEHLER 93 and HOEHLER 94 for a detailed discussion of the evidence for and the pole parameters of $N$ and $\Delta$ resonances as determined from Argand diagrams of $\pi N$ elastic partial-wave amplitudes and from plots of the speeds with which the amplitudes traverse the diagrams.

[4] LONGACRE 78 values are from a search for poles in the unitarized T-matrix. The first (second) value uses, in addition to $\pi N \to N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis.

[5] SAXON 80 finds the coupling phase is near 90°.

[6] The range given is from the four best solutions. DEANS 75 disagrees with $\pi^+ p \to \Sigma^+ K^+$ data of WINNIK 77 around 1920 MeV.

[7] LONGACRE 77 considers this coupling to be well determined.

[8] A Breit-Wigner fit to the HERNDON 75 IPWA.

## $N(1675)$ REFERENCES

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


| | | | | |
|---|---|---|---|---|
| HOEHLER | 94 | $\pi N$ Newsletter 10 (to be pub.) | | (KARL) |
| HOEHLER | 93 | $\pi N$ Newsletter 9 1 | | (KARL) |
| LI | 93 | PR C47 2759 | +Arndt, Roper, Workman | (VPI) |
| MANLEY | 92 | PR D45 4002 | +Saleski | (KENT) IJP |
| Also | 84 | PR D30 904 | Manley, Arndt, Goradia, Teplitz | (VPI) |
| ARNDT | 91 | PR D43 2131 | +Li, Roper, Workman, Ford | (VPI, TELE) IJP |
| ARNDT | 85 | PR D32 1085 | +Ford, Roper | (VPI) |
| BELL | 83 | NP B222 389 | +Blissett, Broome, Daley, Hart, Lintern+ | (RL) IJP |
| CRAWFORD | 83 | NP B211 1 | +Morton | (GLAS) |
| PDG | 82 | PL 111B | Roos, Porter, Aguilar-Benitez+ | (HELS, CIT, CERN) |
| AWAJI | 81 | Bonn Conf. 352 | +Kajikawa | (NAGO) |
| Also | 82 | NP B197 365 | Fujii, Hayashii, Iwata, Kajikawa+ | (NAGO) |
| FUJII | 81 | NP B187 53 | +Hayashii, Iwata, Kajikawa+ | (NAGO, OSAK) |
| ARAI | 80 | Toronto Conf. 93 | | (INUS) |
| Also | 82 | NP B194 251 | Arai, Fujii | (INUS) |
| CRAWFORD | 80 | Toronto Conf. 107 | | (GLAS) |
| CUTKOSKY | 80 | Toronto Conf. 19 | +Forsyth, Babcock, Kelly, Hendrick | (CMU, LBL) IJP |
| Also | 79 | PR D20 2839 | Cutkosky, Forsyth, Hendrick, Kelly | (CMU, LBL) IJP |
| SAXON | 80 | NP B162 522 | +Baker, Bell, Blissett, Bloodworth+ | (RHEL, BRIS) IJP |
| TAKEDA | 80 | NP B168 17 | +Arai, Fujii, Ikeda, Iwasaki+ | (TOKY, INUS) |
| BAKER | 79 | NP B156 93 | +Brown, Clark, Davies, Depagter, Evans+ | (RHEL) IJP |
| HOEHLER | 79 | PDAT 12-1 | +Kaiser, Koch, Pietarinen | (KARLT) IJP |
| Also | 80 | Toronto Conf. 3 | Koch | (KARLT) IJP |
| BARBOUR | 78 | NP B141 253 | +Crawford, Parsons | (GLAS) |
| LONGACRE | 78 | PR D17 1795 | +Lasinski, Rosenfeld, Smadja+ | (LBL, SLAC) |
| NOVOSELLER | 78 | NP B137 509 | | (CIT) IJP |
| Also | 78B | NP B137 445 | Novoseller | (CIT) IJP |
| LONGACRE | 77 | NP B122 493 | +Dolbeau | (SACL) IJP |
| Also | 76 | NP B108 365 | Dolbeau, Triantis, Neveu, Cadiet | (SACL) IJP |
| WINNIK | 77 | NP B128 66 | +Toaff, Revel, Goldberg, Berny | (HAIF) I |
| FELLER | 76 | NP B104 219 | +Fukushima, Horikawa, Kajikawa+ | (NAGO, OSAK) IJP |
| DEANS | 75 | NP B96 90 | +Mitchell, Montgomery+ | (SFLA, ALAH) IJP |
| FELTESSE | 75 | NP B93 242 | +Ayed, Bareyre, Borgeaud, David+ | (SACL) IJP |
| HERNDON | 75 | PR D11 3183 | +Longacre, Miller, Rosenfeld+ | (LBL, SLAC) |
| LONGACRE | 75 | PL 55B 415 | +Rosenfeld, Lasinski, Smadja+ | (LBL, SLAC) IJP |
| DEVENISH | 74B | NP B81 330 | +Froggatt, Martin | (DESY, NORD, LOUC) |