# $N(2250)$ $G_{19}$

$I(J^P) = \frac{1}{2}(\frac{9}{2}^-)$ Status: ****

## $N(2250)$ BREIT-WIGNER MASS

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **2200 to 2350 (≈ 2275) OUR ESTIMATE** | | | | |
| 2250 ± 80 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 2268 ± 15 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| 2200 ± 100 | HENDRY | 78 | MPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 2376 ± 43 | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| 2291 | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |

## $N(2250)$ BREIT-WIGNER WIDTH

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **230 to 800 (≈ 500) OUR ESTIMATE** | | | | |
| 480 ± 120 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 300 ± 40 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| 350 ± 100 | HENDRY | 78 | MPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 924 ± 178 | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| 772 | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |

## $N(2250)$ POLE POSITION

### REAL PART

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **2150 to 2250 (≈ 2200) OUR ESTIMATE** | | | | |
| 2187 | [1] HOEHLER | 93 | SPED | $\pi N \to \pi N$ |
| 2150 ± 50 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 2238 | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| 2087 | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |
| 2243 | ARNDT | 91 | DPWA | $\pi N \to \pi N$ Soln SM90 |

### −2×IMAGINARY PART

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **350 to 550 (≈ 450) OUR ESTIMATE** | | | | |
| 388 | [1] HOEHLER | 93 | SPED | $\pi N \to \pi N$ |
| 360 ± 100 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 536 | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| 680 | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |
| 650 | ARNDT | 91 | DPWA | $\pi N \to \pi N$ Soln SM90 |

## *N*(2250) ELASTIC POLE RESIDUE

### MODULUS $|r|$

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| 21 | HOEHLER | 93 | SPED | $\pi N \to \pi N$ |
| $20 \pm 6$ | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 33 | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| 24 | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |
| 47 | ARNDT | 91 | DPWA | $\pi N \to \pi N$ Soln SM90 |

### PHASE $\theta$

| *VALUE* (°) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| $-50 \pm 20$ | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $-25$ | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| $-44$ | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |
| $-37$ | ARNDT | 91 | DPWA | $\pi N \to \pi N$ Soln SM90 |

## *N*(2250) DECAY MODES

The following branching fractions are our estimates, not fits or averages.

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $N\pi$ | 5–15 % |
| $\Gamma_2$ | $N\eta$ | |
| $\Gamma_3$ | $\Lambda K$ | |

## *N*(2250) BRANCHING RATIOS

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

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **0.05 to 0.15 OUR ESTIMATE** | | | | |
| $0.10 \pm 0.02$ | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| $0.10 \pm 0.02$ | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |
| $0.09 \pm 0.02$ | HENDRY | 78 | MPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $0.110 \pm 0.004$ | ARNDT | 04 | DPWA | $\pi N \to \pi N, \eta N$ |
| 0.10 | ARNDT | 95 | DPWA | $\pi N \to N\pi$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \to N(2250) \to N\eta$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

| *VALUE* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $-0.043$ | BAKER | 79 | DPWA | $\pi^- p \to n\eta$ |

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(2250) \to \Lambda K$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| −0.02 | BELL | 83 | DPWA | $\pi^- p \to \Lambda K^0$ |
| not seen | SAXON | 80 | DPWA | $\pi^- p \to \Lambda K^0$ |

## N(2250) FOOTNOTES

[1] See HOEHLER 93 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.

## N(2250) REFERENCES


| | | | | |
|---|---|---|---|---|
| ARNDT | 04 | PR C69 035213 | R.A. Arndt *et al.* | (GWU, TRIU) |
| ARNDT | 95 | PR C52 2120 | R.A. Arndt *et al.* | (VPI, BRCO) |
| HOEHLER | 93 | $\pi N$ Newsletter 9 1 | G. Hohler | (KARL) |
| 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 |
| CUTKOSKY | 80 | Toronto Conf. 19 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP |
| Also | | PR D20 2839 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP |
| SAXON | 80 | NP B162 522 | D.H. Saxon *et al.* | (RHEL, BRIS) IJP |
| BAKER | 79 | NP B156 93 | R.D. Baker *et al.* | (RHEL) IJP |
| HOEHLER | 79 | PDAT 12-1 | G. Hohler *et al.* | (KARLT) IJP |
| Also | | Toronto Conf. 3 | R. Koch | (KARLT) IJP |
| HENDRY | 78 | PRL 41 222 | A.W. Hendry | (IND, LBL) IJP |
| Also | | ANP 136 1 | A.W. Hendry | (IND) |