# $N(2250)\ 9/2^-$

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

Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014).

## *N*(2250) POLE POSITION

### REAL PART

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **2150 to 2250 (≈ 2200) OUR ESTIMATE** | | | | |
| 2157± 3±14 | [1] SVARC | 14 | L+P | $\pi N \to \pi N$ |
| 2195±45 | ANISOVICH | 12A | DPWA | Multichannel |
| 2150±50 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 2062 | ROENCHEN | 15A | DPWA | Multichannel |
| 2217 | ARNDT | 06 | DPWA | $\pi N \to \pi N, \eta N$ |
| 2187 | HOEHLER | 93 | SPED | $\pi N \to \pi N$ |

[1] Fit to the amplitudes of HOEHLER 79.

### −2×IMAGINARY PART

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **350 to 500 (≈ 420) OUR ESTIMATE** | | | | |
| 412± 7±44 | [1] SVARC | 14 | L+P | $\pi N \to \pi N$ |
| 470± 50 | ANISOVICH | 12A | DPWA | Multichannel |
| 360±100 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 403 | ROENCHEN | 15A | DPWA | Multichannel |
| 431 | ARNDT | 06 | DPWA | $\pi N \to \pi N, \eta N$ |
| 388 | HOEHLER | 93 | SPED | $\pi N \to \pi N$ |

[1] Fit to the amplitudes of HOEHLER 79.

## *N*(2250) ELASTIC POLE RESIDUE

### MODULUS $|r|$

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **20 to 30 (≈ 25) OUR ESTIMATE** | | | | |
| 24 ±1±5 | [1] SVARC | 14 | L+P | $\pi N \to \pi N$ |
| 26 ±5 | ANISOVICH | 12A | DPWA | Multichannel |
| 20 ±6 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 8.2 | ROENCHEN | 15A | DPWA | Multichannel |
| 21 | ARNDT | 06 | DPWA | $\pi N \to \pi N, \eta N$ |
| 21 | HOEHLER | 93 | SPED | $\pi N \to \pi N$ |

[1] Fit to the amplitudes of HOEHLER 79.

### PHASE $\theta$

| VALUE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **−60 to −20 (≈ −40) OUR ESTIMATE** | | | | |
| −62± 1±11 | [1] SVARC | 14 | L+P | $\pi N \rightarrow \pi N$ |
| −38±25 | ANISOVICH | 12A | DPWA | Multichannel |
| −50±20 | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| −64 | ROENCHEN | 15A | DPWA | Multichannel |
| −20 | ARNDT | 06 | DPWA | $\pi N \rightarrow \pi N, \eta N$ |

[1] Fit to the amplitudes of HOEHLER 79.

## N(2250) INELASTIC POLE RESIDUE

The "normalized residue" is the residue divided by $\Gamma_{pole}/2$.

### Normalized residue in $N\pi \rightarrow N(2250) \rightarrow N\eta$

| MODULUS | PHASE (°) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.017 | −89 | ROENCHEN | 15A | DPWA Multichannel |

### Normalized residue in $N\pi \rightarrow N(2250) \rightarrow \Lambda K$

| MODULUS | PHASE (°) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.006 | −101 | ROENCHEN | 15A | DPWA Multichannel |

### Normalized residue in $N\pi \rightarrow N(2250) \rightarrow \Sigma K$

| MODULUS | PHASE (°) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.002 | 70 | ROENCHEN | 15A | DPWA Multichannel |

## N(2250) BREIT-WIGNER MASS

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2250 to 2320 (≈ 2280) OUR ESTIMATE** | | | | |
| 2280±40 | ANISOVICH | 12A | DPWA | Multichannel |
| 2302± 6 | [1] ARNDT | 06 | DPWA | $\pi N \rightarrow \pi N, \eta N$ |
| 2250±80 | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |
| 2268±15 | HOEHLER | 79 | IPWA | $\pi N \rightarrow \pi N$ |

[1] Statistical error only.

## N(2250) BREIT-WIGNER WIDTH

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **300 to 600 (≈ 500) OUR ESTIMATE** | | | | |
| 520± 50 | ANISOVICH | 12A | DPWA | Multichannel |
| 628± 28 | [1] ARNDT | 06 | DPWA | $\pi N \rightarrow \pi N, \eta N$ |
| 480±120 | CUTKOSKY | 80 | IPWA | $\pi N \rightarrow \pi N$ |
| 300± 40 | HOEHLER | 79 | IPWA | $\pi N \rightarrow \pi N$ |

[1] Statistical error only.

## *N*(2250) DECAY MODES

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

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $N\pi$ | 0.05 to 0.15 ($\approx 0.10$) |

## *N*(2250) BRANCHING RATIOS

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

| *VALUE* (%) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **5 to 15 (≈ 10) OUR ESTIMATE** | | | | |
| 12 ±4 | ANISOVICH | 12A | DPWA | Multichannel |
| 8.9±0.1 | [1] ARNDT | 06 | DPWA | $\pi N \to \pi N$, $\eta N$ |
| 10 ±2 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 10 ±2 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |

[1] Statistical error only.

## *N*(2250) PHOTON DECAY AMPLITUDES AT THE POLE

### *N*(2250) → $p\gamma$, helicity-1/2 amplitude $A_{1/2}$

| *MODULUS* ($GeV^{-1/2}$) | *PHASE* (°) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| $-0.090^{+0.025}_{-0.022}$ | $-49^{+17}_{-11}$ | ROENCHEN | 14 | DPWA | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.026 | −26 | ROENCHEN | 15A | DPWA | Multichannel |

### *N*(2250) → $p\gamma$, helicity-3/2 amplitude $A_{3/2}$

| *MODULUS* ($GeV^{-1/2}$) | *PHASE* (°) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| $0.049^{+0.031}_{-0.019}$ | $171^{+36}_{-43}$ | ROENCHEN | 14 | DPWA | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.119 | −42 | ROENCHEN | 15A | DPWA | Multichannel |

## *N*(2250) REFERENCES


| | | | | |
|---|---|---|---|---|
| ROENCHEN | 15A | EPJ A51 70 | D. Roenchen *et al.* | |
| PDG | 14 | CP C38 070001 | K. Olive *et al.* | (PDG Collab.) |
| ROENCHEN | 14 | EPJ A50 101 | D. Roenchen *et al.* | |
| Also | | EPJ A51 63 (errat.) | D. Roenchen *et al.* | |
| SVARC | 14 | PR C89 045205 | A. Svarc *et al.* | (RBI Zagreb, UNI Tuzla) |
| ANISOVICH | 12A | EPJ A48 15 | A.V. Anisovich *et al.* | (BONN, PNPI) |
| ARNDT | 06 | PR C74 045205 | R.A. Arndt *et al.* | (GWU) |
| HOEHLER | 93 | $\pi N$ Newsletter 9 1 | G. Hohler | (KARL) |
| 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 |
| HOEHLER | 79 | PDAT 12-1 | G. Hohler *et al.* | (KARLT) IJP |
| Also | | Toronto Conf. 3 | R. Koch | (KARLT) IJP |