NODE=B113

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

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

NODE=B113

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

## N(2250) POLE POSITION

NODE=B113215

### REAL PART

NODE=B113RE
NODE=B113RE

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2100 to 2200 (≈ 2150) OUR ESTIMATE** | | | | |
| 2095±10 | ROENCHEN | 22 | DPWA | Multichannel |
| 2195±45 | AFZAL | 20 | DPWA | Multichannel |
| 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. • • • | | | | |
| 2127 | HUNT | 19 | DPWA | Multichannel |
| 2062 | ROENCHEN | 15A | DPWA | Multichannel |
| 2217 | ARNDT | 06 | DPWA | $\pi N \to \pi N$, $\eta N$ |
| 2187 | HOEHLER | 93 | SPED | $\pi N \to \pi N$ |

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B113RE;LINKAGE=SV

### −2×IMAGINARY PART

NODE=B113IM
NODE=B113IM

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **350 to 500 (≈ 420) OUR ESTIMATE** | | | | |
| 422± 13 | ROENCHEN | 22 | DPWA | Multichannel |
| 470± 50 | AFZAL | 20 | DPWA | Multichannel |
| 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. • • • | | | | |
| 262 | HUNT | 19 | DPWA | Multichannel |
| 403 | ROENCHEN | 15A | DPWA | Multichannel |
| 431 | ARNDT | 06 | DPWA | $\pi N \to \pi N$, $\eta N$ |
| 388 | HOEHLER | 93 | SPED | $\pi N \to \pi N$ |

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B113IM;LINKAGE=SV

## N(2250) ELASTIC POLE RESIDUE

NODE=B113220

### MODULUS |r|

NODE=B113RER
NODE=B113RER

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **15 to 30 (≈ 25) OUR ESTIMATE** | | | | |
| 14 ±1 | ROENCHEN | 22 | DPWA | Multichannel |
| 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 | $\pi N \to \pi N$ |

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B113RER;LINKAGE=SV

### PHASE θ

NODE=B113IMR
NODE=B113IMR

| VALUE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **−60 to −20 (≈ −40) OUR ESTIMATE** | | | | |
| −67± 9 | ROENCHEN | 22 | DPWA | Multichannel |
| −62± 1±11 | [1] SVARC | 14 | L+P | $\pi N \to \pi N$ |
| −38±25 | ANISOVICH | 12A | DPWA | Multichannel |
| −50±20 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| −64 | ROENCHEN | 15A | DPWA | Multichannel |
| −20 | ARNDT | 06 | DPWA | $\pi N \to \pi N$, $\eta N$ |

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B113IMR;LINKAGE=SV

## $N(2250)$ INELASTIC POLE RESIDUE

NODE=B113250

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

NODE=B113250

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

NODE=B113A00
NODE=B113A00

| MODULUS | PHASE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| 0.018±0.001 | −89 ± 5 | ROENCHEN | 22 | DPWA | Multichannel |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.017 | −89 | ROENCHEN | 15A | DPWA | Multichannel |

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

NODE=B113A01
NODE=B113A01

| MODULUS | PHASE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| 0.003±0.001 | 80 ± 5 | ROENCHEN | 22 | DPWA | Multichannel |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.006 | −101 | ROENCHEN | 15A | DPWA | Multichannel |

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

NODE=B113A02
NODE=B113A02

| MODULUS | PHASE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| 0.004±0.002 | −111 ± 5 | ROENCHEN | 22 | DPWA | Multichannel |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.002 | 70 | ROENCHEN | 15A | DPWA | Multichannel |

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

NODE=B113M

NODE=B113M

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **2250 to 2320 (≈ 2280) OUR ESTIMATE** | | | | |
| 2200±10 | [1] HUNT | 19 | DPWA | Multichannel |
| 2280±40 | ANISOVICH | 12A | DPWA | Multichannel |
| 2302± 6 | [1] ARNDT | 06 | DPWA | $\pi N \to \pi N$, $\eta N$ |
| 2250±80 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 2268±15 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |

→ UNCHECKED ←

[1] Statistical error only.

NODE=B113M;LINKAGE=A

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

NODE=B113W

NODE=B113W

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **300 to 600 (≈ 500) OUR ESTIMATE** | | | | |
| 343± 51 | [1] HUNT | 19 | DPWA | Multichannel |
| 520± 50 | ANISOVICH | 12A | DPWA | Multichannel |
| 628± 28 | [1] ARNDT | 06 | DPWA | $\pi N \to \pi N$, $\eta N$ |
| 480±120 | CUTKOSKY | 80 | IPWA | $\pi N \to \pi N$ |
| 300± 40 | HOEHLER | 79 | IPWA | $\pi N \to \pi N$ |

→ UNCHECKED ←

[1] Statistical error only.

NODE=B113W;LINKAGE=A

## $N(2250)$ DECAY MODES

NODE=B113225;NODE=B113

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

NODE=B113

| | Mode | Fraction ($\Gamma_i/\Gamma$) | |
|---|---|---|---|
| $\Gamma_1$ | $N\pi$ | 5–15 % | DESIG=1 |
| $\Gamma_2$ | $N\eta$ | <5 % | DESIG=4 |
| $\Gamma_3$ | $\Lambda K$ | 1–3 % | DESIG=5 |

## $N(2250)$ BRANCHING RATIOS

NODE=B113230

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

NODE=B113R1
NODE=B113R1

| VALUE (%) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **5–15 % OUR ESTIMATE** | | | | |
| 8.5±0.4 | [1] HUNT | 19 | DPWA | Multichannel |
| 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 | $\pi N \to \pi N$ |

→ UNCHECKED ←

[1] Statistical error only.

NODE=B113R1;LINKAGE=A

### $\Gamma(N\eta)/\Gamma_{total}$ $\Gamma_2/\Gamma$

NODE=B113R00
NODE=B113R00

| VALUE (%) | | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<5 % OUR ESTIMATE** | | | | | |
| <5 | [1] | HUNT | 19 | DPWA | Multichannel |

→ UNCHECKED ←

[1] Statistical error only.

NODE=B113R00;LINKAGE=A

### $\Gamma(\Lambda K)/\Gamma_{total}$ $\Gamma_3/\Gamma$

NODE=B113R01
NODE=B113R01

| VALUE (%) | | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1–3 % OUR ESTIMATE** | | | | | |
| 2.0±0.6 | [1] | HUNT | 19 | DPWA | Multichannel |

→ UNCHECKED ←

[1] Statistical error only.

NODE=B113R01;LINKAGE=A

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

NODE=B113260

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

NODE=B113PA1
NODE=B113PA1

| MODULUS ($GeV^{-1/2}$) | PHASE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| −0.108±0.007 | 112 ± 4 | ROENCHEN | 22 | DPWA | Multichannel |
| • • • 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 $A_{3/2}$

NODE=B113PA2
NODE=B113PA2

| MODULUS ($GeV^{-1/2}$) | PHASE (°) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| 0.050±0.011 | 69 ± 8 | ROENCHEN | 22 | DPWA | Multichannel |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.119 | −42 | ROENCHEN | 15A | DPWA | Multichannel |

## N(2250) BREIT-WIGNER PHOTON DECAY AMPLITUDES

NODE=B113240

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

NODE=B113A03
NODE=B113A03

| VALUE ($GeV^{-1/2}$) | | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| 0.0006±0.0037 | [1] | HUNT | 19 | DPWA | Multichannel |

[1] Statistical error only.

NODE=B113A03;LINKAGE=A

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

NODE=B113A04
NODE=B113A04

| VALUE ($GeV^{-1/2}$) | | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| 0.013±0.004 | [1] | HUNT | 19 | DPWA | Multichannel |

[1] Statistical error only.

NODE=B113A04;LINKAGE=A

## N(2250) REFERENCES

NODE=B113


| | | | | | |
|---|---|---|---|---|---|
| ROENCHEN | 22 | EPJ A58 229 | D. Roenchen *et al.* | (JULI, GWU, BONN+) | REFID=61999 |
| AFZAL | 20 | PRL 125 152002 | F. Afzal *et al.* | (CBELSA/TAPS Collab.) | REFID=60951 |
| HUNT | 19 | PR C99 055205 | B.C. Hunt, D.M. Manley | | REFID=59985 |
| ROENCHEN | 15A | EPJ A51 70 | D. Roenchen *et al.* | | REFID=58183 |
| PDG | 14 | CP C38 070001 | K. Olive *et al.* | (PDG Collab.) | REFID=55687 |
| SVARC | 14 | PR C89 045205 | A. Svarc *et al.* | (RBI Zagreb, UNI Tuzla) | REFID=55775 |
| ANISOVICH | 12A | EPJ A48 15 | A.V. Anisovich *et al.* | (BONN, PNPI) | REFID=54041 |
| ARNDT | 06 | PR C74 045205 | R.A. Arndt *et al.* | (GWU) | REFID=51535 |
| HOEHLER | 93 | $\pi N$ Newsletter 9 1 | G. Hohler | (KARL) | REFID=43821 |
| CUTKOSKY | 80 | Toronto Conf. 19 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP | REFID=30064 |
| Also | | PR D20 2839 | R.E. Cutkosky *et al.* | (CMU, LBL) IJP | REFID=40096 |
| HOEHLER | 79 | PDAT 12-1 | G. Hohler *et al.* | (KARLT) IJP | REFID=30058 |
| Also | | Toronto Conf. 3 | R. Koch | (KARLT) IJP | REFID=30859 |