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

$I(J^P) = \frac{1}{2}(\frac{9}{2}^-)$ 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
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	$\pi N \to \pi N$, ηN
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				
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	$\pi N \to \pi N$, ηN
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
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	$\pi N \to \pi N$

[1] Fit to the amplitudes of HOEHLER 79.

PHASE θ

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	$\pi N \to \pi N, \eta N$

[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 $N\pi \to N(2250) \to N\eta$

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 $N\pi \to N(2250) \to \Lambda K$

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 $N\pi \to N(2250) \to \Sigma K$

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

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	$\pi N \to \pi N$

[1] Statistical error only.

N(2250) BREIT-WIGNER WIDTH

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	$\pi N \to \pi N$

[1] Statistical error only.

N(2250) DECAY MODES

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

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	5–15 %
Γ_2	$N\eta$	<5 %
Γ_3	ΛK	1–3 %

N(2250) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$ Γ_1/Γ

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	$\pi N \to \pi N$

[1] Statistical error only.

$\Gamma(N\eta)/\Gamma_{total}$ Γ_2/Γ

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

[1] Statistical error only.

$\Gamma(\Lambda K)/\Gamma_{total}$ Γ_3/Γ

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

[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
−0.108±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 $A_{3/2}$

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

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

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

[1] Statistical error only.

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

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

[1] Statistical error only.

N(2250) REFERENCES

ROENCHEN	22	EPJ A58 229	D. Roenchen et al.	(JULI, GWU, BONN+)
AFZAL	20	PRL 125 152002	F. Afzal et al.	(CBELSA/TAPS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
ROENCHEN	15A	EPJ A51 70	D. Roenchen et al.	
PDG	14	CP C38 070001	K. Olive et al.	(PDG Collab.)
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	πN 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