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

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

[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

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

$\Gamma(N\eta)/\Gamma_{\text{total}}$ Γ_2/Γ

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

[1] Statistical error only.

$\Gamma(\Lambda K)/\Gamma_{\text{total}}$ 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) → *pγ*, 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) → *pγ*, 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) → *pγ*, 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) → *pγ*, 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