

$N(2250) \ 9/2^-$ $I(J^P) = \frac{1}{2}(\frac{9}{2}^-)$ 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 (\approx 2200) OUR ESTIMATE			
2195 \pm 45	AFZAL	20	DPWA Multichannel
2157 \pm 3 \pm 14	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
2195 \pm 45	ANISOVICH	12A	DPWA Multichannel
2150 \pm 50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● 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 $\pi N \rightarrow \pi N, \eta N$
2187	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

-2xIMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
350 to 500 (\approx 420) OUR ESTIMATE			
470 \pm 50	AFZAL	20	DPWA Multichannel
412 \pm 7 \pm 44	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
470 \pm 50	ANISOVICH	12A	DPWA Multichannel
360 \pm 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● 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 $\pi N \rightarrow \pi N, \eta N$
388	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

 $N(2250)$ ELASTIC POLE RESIDUE**MODULUS $|r|$**

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

¹Fit to the amplitudes of HOEHLER 79.

PHASE θ

<u>VALUE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
–60 to –20 (\approx –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 $N\pi \rightarrow N(2250) \rightarrow N\eta$

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.017	–89	ROENCHEN	15A	DPWA Multichannel

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.006	–101	ROENCHEN	15A	DPWA Multichannel

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.002	70	ROENCHEN	15A	DPWA Multichannel

 $N(2250)$ BREIT-WIGNER MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2250 to 2320 (\approx 2280) OUR ESTIMATE			
2200 ± 10	¹ HUNT	19	DPWA Multichannel
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

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
300 to 600 (\approx 500) OUR ESTIMATE			
343 ± 51	¹ HUNT	19	DPWA Multichannel
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 (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 $\pi N \rightarrow \pi N, \eta N$
10 ± 2	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
10 ± 2	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$

¹Statistical 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

¹Statistical 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

¹Statistical error only. **$N(2250)$ PHOTON DECAY AMPLITUDES AT THE POLE** **$N(2250) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$**

MODULUS ($\text{GeV}^{-1/2}$)	PHASE ($^\circ$)	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

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

MODULUS ($\text{GeV}^{-1/2}$)	PHASE ($^\circ$)	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

$N(2250)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES **$N(2250) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$**

<u>VALUE (GeV^{-1/2})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.0006 ± 0.0037	¹ HUNT	19	DPWA Multichannel

¹ Statistical error only. **$N(2250) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$**

<u>VALUE (GeV^{-1/2})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.013 ± 0.004	¹ HUNT	19	DPWA Multichannel

¹ Statistical error only. **$N(2250)$ REFERENCES**

AFZAL	20	PRL 125 152002	F. Afzal <i>et al.</i>	(CBELSA/TAPS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
ROENCHEN	15A	EPJ A51 70	D. Roenchen <i>et al.</i>	
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
ROENCHEN	14	EPJ A50 101	D. Roenchen <i>et al.</i>	
Also		EPJ A51 63 (errat.)	D. Roenchen <i>et al.</i>	
SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	(RBI Zagreb, UNI Tuzla)
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP