$N(2220)\ 9/2^+$

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

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

$N(2220)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2130 to 2200 ($\approx$ 2170) OUR ESTIMATE				
$2127\pm 3\pm24$	[1] SVARC	14	L+P	$\pi N \to \pi N$
2150 ± 35	ANISOVICH	12A	DPWA	Multichannel
2199	ARNDT	06	DPWA	$\pi N \to \pi N,\ \eta N$
2135	HOEHLER	93	ARGD	$\pi N \to \pi N$
2160 ± 80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

$-2\times$IMAGINARY PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400 to 560 ($\approx$ 480) OUR ESTIMATE				
$380\pm 7\pm22$	[1] SVARC	14	L+P	$\pi N \to \pi N$
440 ± 40	ANISOVICH	12A	DPWA	Multichannel
372	ARNDT	06	DPWA	$\pi N \to \pi N,\ \eta N$
400	HOEHLER	93	ARGD	$\pi N \to \pi N$
480 ± 100	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

$N(2220)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
35 to 60 ($\approx$ 45) OUR ESTIMATE				
$38\pm 1\pm5$	[1] SVARC	14	L+P	$\pi N \to \pi N$
60 ± 12	ANISOVICH	12A	DPWA	Multichannel
33	ARNDT	06	DPWA	$\pi N \to \pi N,\ \eta N$
40	HOEHLER	93	ARGD	$\pi N \to \pi N$
45 ± 20	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

PHASE θ

VALUE (°)	DOCUMENT ID		TECN	COMMENT
-35 to -60 (≈ -50) OUR ESTIMATE				
$-52\pm 1\pm14$	[1] SVARC	14	L+P	$\pi N \to \pi N$
-58 ± 12	ANISOVICH	12A	DPWA	Multichannel
-33	ARNDT	06	DPWA	$\pi N \to \pi N,\ \eta N$
-50	HOEHLER	93	ARGD	$\pi N \to \pi N$
-45 ± 25	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

N(2220) BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2200 to 2300 (≈ 2250) OUR ESTIMATE				
2316.3 ± 2.9	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
2230 ± 80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
2205 ± 10	HOEHLER	79	IPWA	$\pi N \to \pi N$

N(2220) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
350 to 500 (≈ 400) OUR ESTIMATE				
633 ± 17	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
500 ± 150	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
365 ± 30	HOEHLER	79	IPWA	$\pi N \to \pi N$

N(2220) DECAY MODES

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

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	15–25 %

N(2220) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\textbf{total}}$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ Γ_1/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
15 to 25 OUR ESTIMATE				
24 ± 5	ANISOVICH	12A	DPWA	Multichannel
24.6 ± 0.1	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
15 ± 3	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
18.0 ± 1.5	HOEHLER	79	IPWA	$\pi N \to \pi N$

N(2220) PHOTON DECAY AMPLITUDES AT THE POLE

N(2220) → $p\gamma$, helicity-1/2 amplitude $A_{1/2}$

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN
$-0.233^{+0.084}_{-0.044}$	-47^{+10}_{-6}	ROENCHEN	14	DPWA

N(2220) → $p\gamma$, helicity-3/2 amplitude $A_{3/2}$

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN
$0.162^{+0.041}_{-0.038}$	-27^{+26}_{-13}	ROENCHEN	14	DPWA

N(2220) FOOTNOTES

[1] Fit to the amplitudes of HOEHLER 79.

N(2220) REFERENCES

For early references, see Physics Letters **111B** 1 (1982).

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.*	
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