NODE=B090

$N(2220)\ H_{19}$

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

NODE=B090

Most of the results published before 1975 were last included in our 1982 edition, Physics Letters **111B** 1 (1982). Some further obsolete results published before 1980 were last included in our 2006 edition, Journal of Physics, G **33** 1 (2006).

N(2220) BREIT-WIGNER MASS

NODE=B090205

NODE=B090M

→ NOT CHECKED ←

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	$\pi N \to \pi N$
2300 ± 100	HENDRY	78	MPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2270 ± 11	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
2258	ARNDT	95	DPWA	$\pi N \to N\pi$

N(2220) BREIT-WIGNER WIDTH

NODE=B090210

NODE=B090W

→ NOT CHECKED ←

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	$\pi N \to \pi N$
450 ± 150	HENDRY	78	MPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
366 ± 42	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
334	ARNDT	95	DPWA	$\pi N \to N\pi$

N(2220) POLE POSITION

NODE=B090215

REAL PART

NODE=B090RE

NODE=B090RE

→ NOT CHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2130 to 2200 (≈ 2170) OUR ESTIMATE				
2199	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
2135	[1] HOEHLER	93	ARGD	$\pi N \to \pi N$
2160 ± 80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2209	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
2203	ARNDT	95	DPWA	$\pi N \to N\pi$
2253	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90

−2×IMAGINARY PART

NODE=B090IM

NODE=B090IM

→ NOT CHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
400 to 560 (≈ 480) OUR ESTIMATE				
372	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
400	[1] HOEHLER	93	ARGD	$\pi N \to \pi N$
480 ± 100	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
564	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
536	ARNDT	95	DPWA	$\pi N \to N\pi$
640	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90

N(2220) ELASTIC POLE RESIDUE

NODE=B090220

MODULUS $|r|$

NODE=B090RER

NODE=B090RER

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
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	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
96	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
68	ARNDT	95	DPWA	$\pi N \to N\pi$
85	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90

NODE=B090IMR
NODE=B090IMR

PHASE θ

VALUE (°)	DOCUMENT ID		TECN	COMMENT
−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	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−71	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
−43	ARNDT	95	DPWA	$\pi N \to N\pi$
−62	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90

$N(2220)$ DECAY MODES

NODE=B090225;NODE=B090

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

NODE=B090

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	10–20 %
Γ_2	$N\eta$	
Γ_3	ΛK	

DESIG=1;OUR EST
DESIG=2
DESIG=3

$N(2220)$ BRANCHING RATIOS

NODE=B090230

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=B090R1
NODE=B090R1
→ NOT CHECKED ←

VALUE	DOCUMENT ID		TECN	COMMENT
0.1 to 0.2 OUR ESTIMATE				
0.246±0.001	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
0.15 ±0.03	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
0.18 ±0.015	HOEHLER	79	IPWA	$\pi N \to \pi N$
0.12 ±0.04	HENDRY	78	MPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.200±0.006	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
0.26	ARNDT	95	DPWA	$\pi N \to N\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(2220) \to \Lambda K$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B090R3
NODE=B090R3

VALUE	DOCUMENT ID		TECN	COMMENT
not required	BELL	83	DPWA	$\pi^- p \to \Lambda K^0$
not seen	SAXON	80	DPWA	$\pi^- p \to \Lambda K^0$

$N(2220)$ FOOTNOTES

NODE=B090

[1] See HOEHLER 93 for a detailed discussion of the evidence for and the pole parameters of N and Δ resonances as determined from Argand diagrams of πN elastic partial-wave amplitudes and from plots of the speeds with which the amplitudes traverse the diagrams.

NODE=B010;LINKAGE=H9

$N(2220)$ REFERENCES

NODE=B090

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

NODE=B090

ARNDT	06	PR C74 045205	R.A. Arndt *et al.*	(GWU)	REFID=51535
PDG	06	JPG 33 1	W.-M. Yao *et al.*	(PDG Collab.)	REFID=51004
ARNDT	04	PR C69 035213	R.A. Arndt *et al.*	(GWU, TRIU)	REFID=49947
ARNDT	95	PR C52 2120	R.A. Arndt *et al.*	(VPI, BRCO)	REFID=44535
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)	REFID=43821
ARNDT	91	PR D43 2131	R.A. Arndt *et al.*	(VPI, TELE) IJP	REFID=41467
BELL	83	NP B222 389	K.W. Bell *et al.*	(RL) IJP	REFID=30409
PDG	82	PL 111B 1	M. Roos *et al.*	(HELS, CIT, CERN)	REFID=41167
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
SAXON	80	NP B162 522	D.H. Saxon *et al.*	(RHEL, BRIS) IJP	REFID=30404
HOEHLER	79	PDAT 12-1	G. Hohler *et al.*	(KARLT) IJP	REFID=30058
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP	REFID=30859
HENDRY	78	PRL 41 222	A.W. Hendry	(IND, LBL) IJP	REFID=30893
Also		ANP 136 1	A.W. Hendry	(IND)	REFID=30901