

$N(2190) \ 7/2^-$

$$I(J^P) = \frac{1}{2}(\frac{7}{2}^-) \text{ Status: } ****$$

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

NODE=B071

NODE=B071

NODE=B071215

 NODE=B071RE
 NODE=B071RE

→ UNCHECKED ←

NODE=B071RE;LINKAGE=SV

 NODE=B071IM
 NODE=B071IM

→ UNCHECKED ←

NODE=B071IM;LINKAGE=SV

NODE=B071220

 NODE=B071RER
 NODE=B071RER

→ UNCHECKED ←

NODE=B071RER;LINKAGE=SV

$N(2190)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1950 to 2150 ($\approx$ 2050) OUR ESTIMATE			
1965 $\pm$ 6	ROENCHEN	22	DPWA Multichannel
2140 $\pm$ 20	AFZAL	20	DPWA Multichannel
2150 $\pm$ 25	SOKHOYAN	15A	DPWA Multichannel
2079 $\pm$ 4 $\pm$ 9	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
2100 $\pm$ 50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2162	HUNT	19	DPWA Multichannel
2074	ROENCHEN	15A	DPWA Multichannel
2150 $\pm$ 25	ANISOVICH	12A	DPWA Multichannel
2063 $\pm$ 32	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
2070	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2107	VRANA	00	DPWA Multichannel
2042	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹ Fit to the amplitudes of HOEHLER 79.

=2xIMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
300 to 500 ($\approx$ 400) OUR ESTIMATE			
287 $\pm$ 33	ROENCHEN	22	DPWA Multichannel
420 ⁺ 120 — 40	AFZAL	20	DPWA Multichannel
325 $\pm$ 25	SOKHOYAN	15A	DPWA Multichannel
509 $\pm$ 7 $\pm$ 16	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
400 $\pm$ 160	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
407	HUNT	19	DPWA Multichannel
327	ROENCHEN	15A	DPWA Multichannel
330 $\pm$ 30	ANISOVICH	12A	DPWA Multichannel
330 $\pm$ 101	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
520	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
380	VRANA	00	DPWA Multichannel
482	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹ Fit to the amplitudes of HOEHLER 79.

$N(2190)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
20 to 60 ($\approx$ 40) OUR ESTIMATE			
18 $\pm$ 4	ROENCHEN	22	DPWA Multichannel
30 $\pm$ 4	SOKHOYAN	15A	DPWA Multichannel
54 $\pm$ 1 $\pm$ 3	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
25 $\pm$ 10	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
35	ROENCHEN	15A	DPWA Multichannel
30 $\pm$ 5	ANISOVICH	12A	DPWA Multichannel
34	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
72	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
45	HOEHLER	93	SPED $\pi N \rightarrow \pi N$

¹ Fit to the amplitudes of HOEHLER 79.

PHASE θ

VALUE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
−30 to 30 (≈ 0) OUR ESTIMATE			
−45 ± 14	ROENCHEN	22	DPWA Multichannel
28 ± 10	SOKHOYAN	15A	DPWA Multichannel
−18 ± 1 ± 3	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
−30 ± 50	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
−40	ROENCHEN	15A	DPWA Multichannel
30 ± 10	ANISOVICH	12A	DPWA Multichannel
−19	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
−32	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
¹ Fit to the amplitudes of HOEHLER 79.			

NODE=B071IMR
 NODE=B071IMR

→ UNCHECKED ←

NODE=B071IMR;LINKAGE=SV

 $N(2190)$ INELASTIC POLE RESIDUE

The “normalized residue” is the residue divided by $\Gamma_{pole}/2$.

NODE=B071250

NODE=B071250

Normalized residue in $N\pi \rightarrow N(2190) \rightarrow \Lambda K$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.026 ± 0.007	−78 ± 15	ROENCHEN	22	DPWA Multichannel
0.03 ± 0.01	20 ± 15	ANISOVICH	12A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.005	−51	ROENCHEN	15A	DPWA Multichannel

NODE=B071RS1
 NODE=B071RS1

Normalized residue in $N\pi \rightarrow N(2190) \rightarrow \Sigma K$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.005 ± 0.001	−92 ± 16	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.013	−69	ROENCHEN	15A	DPWA Multichannel

NODE=B071A00
 NODE=B071A00

Normalized residue in $N\pi \rightarrow N(2190) \rightarrow N\eta$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.021 ± 0.005	−65 ± 15	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.016	129	ROENCHEN	15A	DPWA Multichannel

NODE=B071A02
 NODE=B071A02
 OCCUR=2

Normalized residue in $N\pi \rightarrow N(2190) \rightarrow \Delta(1232)\pi, D\text{-wave}$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.27 ± 0.04	−165 ± 20	SOKHOYAN	15A	DPWA Multichannel

NODE=B071RS2
 NODE=B071RS2

Normalized residue in $N\pi \rightarrow N(2190) \rightarrow N\sigma$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.13 ± 0.05	50 ± 15	SOKHOYAN	15A	DPWA Multichannel

NODE=B071RS3
 NODE=B071RS3

 $N(2190)$ BREIT-WIGNER MASS

NODE=B071M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2140 to 2220 (≈ 2180) OUR ESTIMATE			
2222 ± 15	¹ HUNT	19	DPWA Multichannel
2205 ± 18	SOKHOYAN	15A	DPWA Multichannel
2152.4 ± 1.4	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2200 ± 70	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2140 ± 12	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2180 ± 20	ANISOVICH	12A	DPWA Multichannel
2150 ± 26	¹ SHRESTHA	12A	DPWA Multichannel
2125 ± 61	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
2168 ± 18	VRANA	00	DPWA Multichannel

NODE=B071M

→ UNCHECKED ←

¹ Statistical error only.**N(2190) BREIT-WIGNER WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
300 to 500 (≈ 400) OUR ESTIMATE			
442 $\pm$ 40	¹ HUNT	19	DPWA Multichannel
355 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel
484 $\pm$ 13	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
500 $\pm$ 150	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
390 $\pm$ 30	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
335 $\pm$ 40	ANISOVICH	12A	DPWA Multichannel
500 $\pm$ 74	¹ SHRESTHA	12A	DPWA Multichannel
381 $\pm$ 160	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
453 $\pm$ 101	VRANA	00	DPWA Multichannel

¹ Statistical error only.**N(2190) DECAY MODES**

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

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	10–20 %
Γ_2 $N\eta$	1–5 %
Γ_3 $N\omega$	8–20 %
Γ_4 ΛK	0.2–0.8 %
Γ_5 $N\pi\pi$	22–51 %
Γ_6 $\Delta(1232)\pi$, D -wave	19–31 %
Γ_7 $N\rho$, $S=3/2$, D -wave	<11 %
Γ_8 $N\sigma$	3–9 %
Γ_9 $\Lambda K^*(892)$	0.2–0.8 %
Γ_{10} $p\gamma$	<0.08 %
Γ_{11} $p\gamma$, helicity=1/2	<0.06 %
Γ_{12} $p\gamma$, helicity=3/2	<0.02 %
Γ_{13} $n\gamma$	<0.04 %
Γ_{14} $n\gamma$, helicity=1/2	<0.01 %
Γ_{15} $n\gamma$, helicity=3/2	<0.03 %

N(2190) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	Γ_1/Γ
10–20 % OUR ESTIMATE				
22.9 $\pm$ 0.6	¹ HUNT	19	DPWA Multichannel	
16 $\pm$ 2	SOKHOYAN	15A	DPWA Multichannel	
23.8 $\pm$ 0.1	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	
12 $\pm$ 6	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$	
14 $\pm$ 2	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
16 $\pm$ 2	ANISOVICH	12A	DPWA Multichannel	
20 $\pm$ 1	¹ SHRESTHA	12A	DPWA Multichannel	
18 $\pm$ 12	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$	
20 $\pm$ 4	VRANA	00	DPWA Multichannel	

¹ Statistical error only.

$\Gamma(N\eta)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	Γ_2/Γ
1–5 % OUR ESTIMATE				
4 $\pm$ 2	MUELLER	20	DPWA Multichannel	
2.7 $\pm$ 2.2	¹ HUNT	19	DPWA Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2 $\pm$ 1	¹ SHRESTHA	12A	DPWA Multichannel	
0.1 $\pm$ 0.3	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$	
0 $\pm$ 1	VRANA	00	DPWA Multichannel	

¹ Statistical error only.

NODE=B071M;LINKAGE=A

NODE=B071W

NODE=B071W

→ UNCHECKED ←

NODE=B071W;LINKAGE=A

NODE=B071225;NODE=B071

NODE=B071

DESIG=1

DESIG=2

DESIG=178

DESIG=3

DESIG=5;OUR EST

DESIG=17

DESIG=6

DESIG=16

DESIG=179

DESIG=11;OUR EST

DESIG=7;OUR EST

DESIG=8;OUR EST

DESIG=19;OUR EST

DESIG=9;OUR EST

DESIG=10;OUR EST

NODE=B071230

NODE=B071R1

NODE=B071R1

→ UNCHECKED ←

NODE=B071R1;LINKAGE=A

NODE=B071R8

NODE=B071R8

→ UNCHECKED ←

NODE=B071R8;LINKAGE=A

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

VALUE (%)

8-20 % OUR ESTIMATE

14±6

• • • We do not use the following data for averages, fits, limits, etc. • • •

seen

DOCUMENT ID

TECN

COMMENT

DENISENKO 16 DPWA Multichannel

WILLIAMS 09 IPWA $\gamma p \rightarrow p\omega$ Γ_3/Γ

NODE=B071R11

NODE=B071R11

→ UNCHECKED ←

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

VALUE (%)

0.2-0.8 % OUR ESTIMATE

0.6±0.1

0.5±0.3

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1

¹ Statistical error only.

DOCUMENT ID

TECN

COMMENT

¹ HUNT 19 DPWA Multichannel

ANISOVICH 12A DPWA Multichannel

¹ SHRESTHA 12A DPWA Multichannel Γ_4/Γ

NODE=B071R12

NODE=B071R12

→ UNCHECKED ←

 $\Gamma(\Delta(1232)\pi, D\text{-wave})/\Gamma_{\text{total}}$

VALUE (%)

19-31 % OUR ESTIMATE

25±6

DOCUMENT ID

TECN

COMMENT

SOKHOYAN 15A DPWA Multichannel

 Γ_6/Γ

NODE=B071R14

NODE=B071R14

→ UNCHECKED ←

 $\Gamma(N\rho, S=3/2, D\text{-wave})/\Gamma_{\text{total}}$

VALUE (%)

<11 % OUR ESTIMATE

<11

• • • We do not use the following data for averages, fits, limits, etc. • • •

29±28

¹ Statistical error only.

DOCUMENT ID

TECN

COMMENT

¹ HUNT 19 DPWA Multichannel

VRANA 00 DPWA Multichannel

 Γ_7/Γ

NODE=B071R9

NODE=B071R9

→ UNCHECKED ←

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

VALUE (%)

3-9 % OUR ESTIMATE

6±3

DOCUMENT ID

TECN

COMMENT

SOKHOYAN 15A DPWA Multichannel

 Γ_8/Γ

NODE=B071R13

NODE=B071R13

→ UNCHECKED ←

 $\Gamma(\Lambda K^*(892))/\Gamma_{\text{total}}$

VALUE (%)

0.2-0.8 % OUR ESTIMATE

0.5±0.3

DOCUMENT ID

TECN

COMMENT

ANISOVICH 17B DPWA Multichannel

 Γ_9/Γ

NODE=B071R00

NODE=B071R00

→ UNCHECKED ←

 $N(2190)$ PHOTON DECAY AMPLITUDES AT THE POLE

NODE=B071260

 $N(2190) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$ MODULUS ($\text{GeV}^{-1/2}$)PHASE ($^\circ$)

DOCUMENT ID

TECN

COMMENT

-0.015±0.004

111 ± 9

ROENCHEN

22

DPWA Multichannel

0.068±0.005

-170 ± 12

SOKHOYAN

15A

DPWA Multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.041

-21

ROENCHEN

15A

DPWA Multichannel

NODE=B071PA1

NODE=B071PA1

 $N(2190) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$ MODULUS ($\text{GeV}^{-1/2}$)PHASE ($^\circ$)

DOCUMENT ID

TECN

COMMENT

0.062±0.011

179 ± 13

ROENCHEN

22

DPWA Multichannel

0.025±0.010

22 ± 10

SOKHOYAN

15A

DPWA Multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.085

-22

ROENCHEN

15A

DPWA Multichannel

NODE=B071PA2

NODE=B071PA2

 $N(2190) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$ MODULUS ($\text{GeV}^{-1/2}$)PHASE ($^\circ$)

DOCUMENT ID

TECN

COMMENT

0.030±0.007

5 ± 15

ANISOVICH

17E

DPWA Multichannel

NODE=B071PA3

NODE=B071PA3

 $N(2190) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$ MODULUS ($\text{GeV}^{-1/2}$)PHASE ($^\circ$)

DOCUMENT ID

TECN

COMMENT

-0.023±0.008

13 ± 20

ANISOVICH

17E

DPWA Multichannel

NODE=B071PA4

NODE=B071PA4

$N(2190)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES **$N(2190) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$**

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
0.001±0.002	¹ HUNT	19	DPWA Multichannel
-0.071±0.006	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.065±0.008	ANISOVICH	12A	DPWA Multichannel
¹ Statistical error only.			

NODE=B071235

NODE=B071A1
NODE=B071A1

NODE=B071A1;LINKAGE=A

 $N(2190) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
0.015±0.003	¹ HUNT	19	DPWA Multichannel
0.027±0.010	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.035±0.017	ANISOVICH	12A	DPWA Multichannel
¹ Statistical error only.			

NODE=B071A2
NODE=B071A2

NODE=B071A2;LINKAGE=A

 $N(2190) \rightarrow p\gamma$, ratio of helicity amplitudes $A_{3/2}/A_{1/2}$

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.17±0.15	WILLIAMS	09	IPWA $\gamma p \rightarrow p\omega$

NODE=B071A01
NODE=B071A01 **$N(2190) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$**

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
-0.01 ±0.02	¹ HUNT	19	DPWA Multichannel
0.030±0.007	ANISOVICH	17E	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.015±0.013	ANISOVICH	13B	DPWA Multichannel
¹ Statistical error only.			

NODE=B071A3
NODE=B071A3

NODE=B071A3;LINKAGE=A

 $N(2190) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
-0.023±0.022	¹ HUNT	19	DPWA Multichannel
-0.023±0.008	ANISOVICH	17E	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.034±0.022	ANISOVICH	13B	DPWA Multichannel
¹ Statistical error only.			

NODE=B071A4
NODE=B071A4

NODE=B071A4;LINKAGE=A

 $N(2190)$ REFERENCESFor early references, see Physics Letters **111B** 1 (1982).

NODE=B071

NODE=B071

ROENCHEN	22	EPJ A58 229	D. Roenchen <i>et al.</i>	(JULI, GWU, BONN+)
AFZAL	20	PRL 125 152002	F. Afzal <i>et al.</i>	(CBELSA/TAPS Collab.)
MUELLER	20	PL B803 135323	J. Mueller <i>et al.</i>	(CBELSA/TAPS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
ANISOVICH	17B	PL B771 142	A.V. Anisovich <i>et al.</i>	
ANISOVICH	17E	PR C96 055202	A.V. Anisovich <i>et al.</i>	(BONN, PNPI, JLAB+)
DENISENKO	16	PL B755 97	I. Denisenko <i>et al.</i>	
ROENCHEN	15A	EPJ A51 70	D. Roenchen <i>et al.</i>	
SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan <i>et al.</i>	(CBELSA/TAPS Collab.)
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	(RBI Zagreb, UNI Tuzla)
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich <i>et al.</i>	
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
BATINIC	10	PR C82 038203	M. Batinic <i>et al.</i>	(ZAGR)
WILLIAMS	09	PR C80 065209	M. Williams <i>et al.</i>	(JLab CLAS Collab.)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
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

REFID=61999
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REFID=59985
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REFID=30859