

$$N(2100) \ 1/2^+$$

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

***N*(2100) POLE POSITION**

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2050 to 2150 ($\approx$ 2100) OUR ESTIMATE			
2120 $\pm$ 25	SOKHOYAN	15A	DPWA Multichannel
2052 $\pm$ 6 $\pm$ 3	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
2120 $\pm$ 40	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2217	HUNT	19	DPWA Multichannel
2120 $\pm$ 47	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1810	VRANA	00	DPWA Multichannel

¹ Fit to the amplitudes of HOEHLER 79.

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
240 to 340 ($\approx$ 300) OUR ESTIMATE			
290 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel
337 $\pm$ 10 $\pm$ 4	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
240 $\pm$ 80	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
545	HUNT	19	DPWA Multichannel
346 $\pm$ 80	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
622	VRANA	00	DPWA Multichannel

¹ Fit to the amplitudes of HOEHLER 79.

***N*(2100) ELASTIC POLE RESIDUE**

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
15 to 30 ($\approx$ 20) OUR ESTIMATE			
23 $\pm$ 5	SOKHOYAN	15A	DPWA Multichannel
30 $\pm$ 1 $\pm$ 1	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
14 $\pm$ 7	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
33	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

¹ Fit to the amplitudes of HOEHLER 79.

PHASE θ

VALUE (°)	DOCUMENT ID	TECN	COMMENT
−100 to −60 ($\approx$ − 80) OUR ESTIMATE			
− 70 $\pm$ 25	SOKHOYAN	15A	DPWA Multichannel
− 92 $\pm$ 3 $\pm$ 2	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
35 $\pm$ 25	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
− 59	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$

¹Fit to the amplitudes of HOEHLER 79.

***N*(2100) INELASTIC POLE RESIDUE**

Normalized residue in *N*π → *N*(2100) → Δ(1232)π

<i>MODULUS</i>	<i>PHASE (°)</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.11±0.05	20 ± 60	SOKHOYAN	15A DPWA	Multichannel

Normalized residue in *N*π → *N*(2100) → *N*σ

<i>MODULUS</i>	<i>PHASE (°)</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.18±0.06	125 ± 25	SOKHOYAN	15A DPWA	Multichannel

Normalized residue in *N*π → *N*(2100) → *N*(1535)π

<i>MODULUS</i>	<i>PHASE (°)</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.22±0.06	− 40 ± 25	SOKHOYAN	15A DPWA	Multichannel

***N*(2100) BREIT-WIGNER MASS**

<i>VALUE (MeV)</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
2050 to 2150 (≈ 2100) OUR ESTIMATE			
2221±92	¹ HUNT	19	DPWA Multichannel
2115±20	SOKHOYAN	15A	DPWA Multichannel
2125±75	CUTKOSKY	80	IPWA π <i>N</i> → π <i>N</i>
2050±20	HOEHLER	79	IPWA π <i>N</i> → π <i>N</i>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2157±42	BATINIC	10	DPWA π <i>N</i> → <i>N</i> π, <i>N</i> η
2068± 3 ⁺¹⁵ _{−40}	ABLIKIM	06K	BES2 <i>J</i> /ψ → (<i>p</i> π [−]) <i>π</i>
2084±93	VRANA	00	DPWA Multichannel

¹Statistical error only.

***N*(2100) BREIT-WIGNER WIDTH**

<i>VALUE (MeV)</i>	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
200 to 320 (≈ 260) OUR ESTIMATE			
545±170	¹ HUNT	19	DPWA Multichannel
290± 20	SOKHOYAN	15A	DPWA Multichannel
260±100	CUTKOSKY	80	IPWA π <i>N</i> → π <i>N</i>
200± 30	HOEHLER	79	IPWA π <i>N</i> → π <i>N</i>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
355± 88	BATINIC	10	DPWA π <i>N</i> → <i>N</i> π, <i>N</i> η
165± 14±40	ABLIKIM	06K	BES2 <i>J</i> /ψ → (<i>p</i> π [−]) <i>π</i>
1077±643	VRANA	00	DPWA Multichannel

¹Statistical error only.

$N(2100)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	8–32 %
Γ_2	$N\eta$	5–45 %
Γ_3	$N\eta'$	5–11 %
Γ_4	$N\omega$	10–25 %
Γ_5	ΛK	<1.0 %
Γ_6	$N\pi\pi$	>55 %
Γ_7	$\Delta(1232)\pi$, P -wave	6–14 %
Γ_8	$N\rho$, $S=1/2$, P -wave	35–70
Γ_9	$N\sigma$	14–35 %
Γ_{10}	$N(1535)\pi$	26–34 %
Γ_{11}	$\Lambda K^*(892)$	3–11 %
Γ_{12}	$p\gamma$, helicity=1/2	0.001–0.13 %
Γ_{13}	$n\gamma$, helicity=1/2	0.004–0.09 %

$N(2100)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$					Γ_1/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
8–32 % OUR ESTIMATE					
21 ± 11	¹ HUNT	19	DPWA	Multichannel	
16 ± 5	SOKHOYAN	15A	DPWA	Multichannel	
12 ± 3	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$	
10 ± 4	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
16 ± 5	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$	
2 ± 5	VRANA	00	DPWA	Multichannel	

¹Statistical error only.

$\Gamma(N\eta)/\Gamma_{\text{total}}$					Γ_2/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
5–45 % OUR ESTIMATE					
30 ± 15	MUELLER	20	DPWA	Multichannel	
< 4.7	¹ HUNT	19	DPWA	Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
83 ± 5	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$	
61 ± 61	VRANA	00	DPWA	Multichannel	

¹Statistical error only.

$\Gamma(N\eta')/\Gamma_{\text{total}}$					Γ_3/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
5–11 % OUR ESTIMATE					
8 ± 3	ANISOVICH	17C	DPWA	Multichannel	

$\Gamma(N\omega)/\Gamma_{\text{total}}$ Γ_4/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**10–25 % OUR ESTIMATE** 15 ± 10

DENISENKO 16 DPWA Multichannel

 $\Gamma(\Lambda K)/\Gamma_{\text{total}}$ Γ_5/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**<1.0 % OUR ESTIMATE**

< 1.0

¹ HUNT 19 DPWA Multichannel

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

 21 ± 20

VRANA 00 DPWA Multichannel

¹ Statistical error only. $\Gamma(\Delta(1232)\pi, P\text{-wave})/\Gamma_{\text{total}}$ Γ_7/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**6–14 % OUR ESTIMATE**

< 7.5

¹ HUNT 19 DPWA Multichannel 10 ± 4

SOKHOYAN 15A DPWA Multichannel

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

 2 ± 1

VRANA 00 DPWA Multichannel

¹ Statistical error only. $\Gamma(N\rho, S=1/2, P\text{-wave})/\Gamma_{\text{total}}$ Γ_8/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**35–70 OUR ESTIMATE** 52 ± 19 ¹ HUNT 19 DPWA Multichannel

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

 4 ± 1

VRANA 00 DPWA Multichannel

¹ Statistical error only. $\Gamma(\Lambda K^*(892))/\Gamma_{\text{total}}$ Γ_{11}/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**3–11 % OUR ESTIMATE** 7 ± 4

ANISOVICH 17B DPWA Multichannel

 $\Gamma(N\sigma)/\Gamma_{\text{total}}$ Γ_9/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**14–35 % OUR ESTIMATE**

<35

¹ HUNT 19 DPWA Multichannel 20 ± 6

SOKHOYAN 15A DPWA Multichannel

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

 10 ± 1

VRANA 00 DPWA Multichannel

¹ Statistical error only. $\Gamma(N(1535)\pi)/\Gamma_{\text{total}}$ Γ_{10}/Γ VALUE (%)DOCUMENT IDTECNCOMMENT**26–34 % OUR ESTIMATE** 30 ± 4

SOKHOYAN 15A DPWA Multichannel

$N(2100)$ PHOTON DECAY AMPLITUDES AT THE POLE

$N(2100) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

<i>MODULUS</i> ($\text{GeV}^{-1/2}$)	<i>PHASE</i> ($^\circ$)	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.011 ± 0.004	65 ± 30	SOKHOYAN	15A	DPWA Multichannel

$N(2100) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

<i>MODULUS</i>	<i>PHASE</i> ($^\circ$)	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.029 ± 0.009	35 ± 20	ANISOVICH	17E	DPWA Multichannel

$N(2100)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

$N(2100) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

<i>VALUE</i> ($\text{GeV}^{-1/2}$)	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.032 ± 0.014	¹ HUNT	19	DPWA Multichannel
0.010 ± 0.004	SOKHOYAN	15A	DPWA Multichannel

¹Statistical error only.

$N(2100) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

<i>VALUE</i> ($\text{GeV}^{-1/2}$)	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.026 ± 0.013	¹ HUNT	19	DPWA Multichannel
0.029 ± 0.010	ANISOVICH	17E	DPWA Multichannel

¹Statistical error only.

$N(2100)$ REFERENCES

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	17C	PL B772 247	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>	
SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan <i>et al.</i>	(CBELSA/TAPS Collab.)
SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	(RBI Zagreb, UNI Tuzla)
BATINIC	10	PR C82 038203	M. Batinic <i>et al.</i>	(ZAGR)
ABLIKIM	06K	PRL 97 062001	M. Ablikim <i>et al.</i>	(BES II Collab.)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
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)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP