$N(1900) \ 3/2^{+}$

 $I(J^P) = \frac{1}{2}(\frac{3}{2}^+)$ Status: ***

N(1900) POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT				
1900 to 1940 (≈ 1920) OUR ESTIMATE								
1910 ± 30	SOKHOYAN	15A	DPWA	Multichannel				
$1928 \pm 18 \pm 2$	¹ SVARC	14	L+P	$\pi N \rightarrow \pi N$				
• • • We do not use the following	data for averages	s, fits,	limits, e	etc. • • •				
1910 ± 30	GUTZ	14	DPWA	Multichannel				
1910	SHKLYAR	13	DPWA	Multichannel				
1900 ± 30	ANISOVICH	12A	DPWA	Multichannel				
1895	SHRESTHA	12A	DPWA	Multichannel				
-2×IMAGINARY PART								
VALUE (MeV)	DOCUMENT ID		TECN	COMMENT				
130 to 300 OUR ESTIMATE								
280± 50	SOKHOYAN	15A	DPWA	Multichannel				
$152 \pm 40 \pm 9$	¹ SVARC	14	L+P	$\pi N \rightarrow \pi N$				
• • • We do not use the following	data for averages	s, fits,	limits, e	etc. • • •				
280± 50	GUTZ	14	DPWA	Multichannel				
173	SHKLYAR	13	DPWA	Multichannel				
200^{+100}_{-60}	ANISOVICH	12A	DPWA	Multichannel				
100	SHRESTHA	12A	DPWA	Multichannel				

N(1900) ELASTIC POLE RESIDUE

MODULUS |r|

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
4±2	SOKHOYAN	15A	DPWA	Multichannel
$4 \pm 1 \pm 1$	¹ SVARC	14	L + P	$\pi N \rightarrow \pi N$
• • • We do not use the following	data for averages	s, fits,	limits, e	tc. • • •
4±2	GUTZ	14	DPWA	Multichannel
10	SHKLYAR	13	DPWA	Multichannel
3 ± 2	ANISOVICH	12A	DPWA	Multichannel
PHASE θ VALUE (°)	DOCUMENT ID		TECN	COMMENT
	DOCUMENT ID	15A		COMMENT Multichannel
VALUE (°)	-		DPWA	
<u>VALUE</u> (°) −10±40	SOKHOYAN ¹ SVARC	14	DPWA L+P	$\begin{array}{ccc} Multichannel \\ \pi N \to \pi N \end{array}$
VALUE (°) −10±40 −29±15±2	SOKHOYAN ¹ SVARC	14	DPWA L+P limits, e	$\begin{array}{ccc} Multichannel \\ \pi N \to \pi N \end{array}$
VALUE (°) -10 ± 40 $-29\pm15\pm2$ • • • We do not use the following	SOKHOYAN 1 SVARC data for averages	14 s, fits,	DPWA L+P limits, e	Multichannel $\pi N \rightarrow \pi N$ etc. $\bullet \bullet \bullet$

N(1900) INELASTIC POLE RESIDUE

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

Normalized	residue in $N\pi ightarrow$	$N(1900) \rightarrow N\eta$		
MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
$0.05\!\pm\!0.02$	70 ± 60	DOCUMENT ID ANISOVICH 12A	DPWA	Multichannel
Normalized	residue in $N\pi ightarrow$	$N(1900) \rightarrow \Lambda K$		
MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.07 ± 0.03	135 ± 25	ANISOVICH 12A	DPWA	Multichannel
Normalized	residue in $N\pi$ $ ightarrow$	$N(1900) \rightarrow \Sigma K$		
		DOCUMENT ID		
0.04 ± 0.02	110 ± 30	ANISOVICH 12A	DPWA	Multichannel
		$N(1900) \rightarrow N(1535)$		
MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.04 ± 0.01	170 ± 30	DOCUMENT ID GUTZ 14	DPWA	Multichannel
Normalized	residue in $N\pi$ $ ightarrow$	$N(1900) \rightarrow \Delta(1232)$	2)π, <i>P</i> -v	vave
MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.07 ± 0.04	-65 ± 30	SOKHOYAN 15A	DPWA	Multichannel
		$N(1900) \rightarrow \Delta(1232)$		
MODULUS	PHASE (°)	DOCUMENT ID SOKHOYAN 15A	TECN	COMMENT
0.10 ± 0.05	80 ± 30	SOKHOYAN 15A	DPWA	Multichannel
Normalized	residue in $N\pi ightarrow$	$N(1900) \rightarrow N(1520)$	$0)\pi$	
MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.07 ± 0.04	-105 ± 35	SOKHOYAN 15A	DPWA	Multichannel
Normalized	residue in $N\pi$ $ ightarrow$	$N(1900) \rightarrow N\sigma$		
		DOCUMENT ID		
0.03 ± 0.02	-110 ± 35	SOKHOYAN 15A	DPWA	Multichannel
	N(1900) BREIT-WIGNER M	ASS	
<i>VALUE</i> (MeV)		DOCUMENT ID 1	TECN CC	DMMENT
	IR ESTIMATE			
1910 ± 30		SOKHOYAN 15A [
1998 ± 3				
14/		SHKLYAR 13 Edata for averages, fits, li		

 1910 ± 30

 1905 ± 30

 1900 ± 8 1951 ± 53 GUTZ

ANISOVICH

SHRESTHA

PENNER

14 DPWA Multichannel

12A DPWA Multichannel

12A DPWA Multichannel

02C DPWA Multichannel

N(1900) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
200± 50 OUR ESTIMATE				
270± 50	SOKHOYAN	15A	DPWA	Multichannel
359± 10	SHKLYAR	13	DPWA	Multichannel
• • • We do not use the following of	data for averages	s, fits,	limits, e	tc. • • •
270± 50	GUTZ	14	DPWA	Multichannel
250^{+120}_{-50}	ANISOVICH	12A	DPWA	Multichannel
101 ± 15	SHRESTHA	12A	DPWA	Multichannel
622± 42	PENNER	02C	DPWA	Multichannel

N(1900) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
$\overline{\Gamma_1}$	$N\pi$	<10 %
Γ_2	$N\eta$	2–14 %
Γ_3	N ω	7–13 %
Γ_4	ΛK	2–20 %
Γ_5	ΣK	3–7 %
Γ_6	$N\pi\pi$	40–80 %
Γ_7	$\Delta(1232)\pi$	30–70 %
Γ ₈	${\it \Delta}(1232)\pi$, ${\it P}$ -wave	9–25 %
Γ ₉	${\it \Delta}(1232)\pi$, $\it F-wave$	21–45 %
Γ_{10}	$N\sigma$	1–7 %
Γ_{11}	$N(1520)\pi$	7–23 %
Γ_{12}	$N(1535)\pi$	4–10 %
Γ_{13}	$oldsymbol{ ho}\gamma$	0.001-0.025 %
Γ_{14}	$p\gamma$, helicity $=1/2$	0.001-0.021 %
Γ_{15}	$p\gamma$, helicity=3/2	<0.003 %
Γ_{16}	$n\gamma$	<0.040 %
Γ_{17}	$n\gamma$, helicity $=1/2$	<0.007 %
Γ ₁₈	$n\gamma$, helicity=3/2	<0.033 %

N(1900) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{ m total}$					Γ_1/Γ
VALUE (%)	DOCUMENT ID		TECN	COMMENT	
3 ± 2	SOKHOYAN	15A	DPWA	Multichannel	
25 ± 1	SHKLYAR	13	DPWA	Multichannel	
• • • We do not use the following of	data for averages	s, fits,	limits, e	tc. • • •	
3 ± 2	GUTZ	14	DPWA	Multichannel	
3 ± 2	ANISOVICH	12A	DPWA	Multichannel	
7 ± 4	SHRESTHA	12A	DPWA	Multichannel	
16 ± 2	PENNER	02C	DPWA	Multichannel	

HTTP://PDG.LBL.GOV Page 3 Created: 5/30/2017 17:20

$\Gamma(N\eta)/\Gamma_{\text{total}}$					Γ_2/Γ
VALUE (%)	DOCUMENT ID		TECN	COMMENT	
2 ± 2	SHKLYAR	13	DPWA	Multichannel	
10 ± 4	ANISOVICH	12A	DPWA	Multichannel	
• • • We do not use the following of	lata for averages	, fits,	limits, e	etc. • • •	
< 1	SHRESTHA	12A	DPWA	Multichannel	
14 ± 5	PENNER	02 C	DPWA	Multichannel	
$\Gamma(N\omega)/\Gamma_{total}$					Г ₃ /Г
VALUE (%)	DOCUMENT ID		TECN	COMMENT	
15 ± 8	DENISENKO	16	DPWA	Multichannel	
10 ± 3	SHKLYAR	13	DPWA	Multichannel	
• • • We do not use the following of	lata for averages	, fits,	limits, e	etc. • • •	
39 ± 9	PENNER	02 C	DPWA	Multichannel	
$\Gamma(\Lambda K)/\Gamma_{\text{total}}$					Γ_4/Γ
VALUE (%)	DOCUMENT ID		TECN	COMMENT	
16 ±5	ANISOVICH	12A	DPWA	Multichannel	
2.4 ± 0.3	SHKLYAR	05	DPWA	Multichannel	
• • • We do not use the following of	lata for averages	, fits,	limits, e	etc. • • •	
14 ±5	SHRESTHA	12A	DPWA	Multichannel	
5 to 15	NIKONOV	08	DPWA	Multichannel	
$0.1 \!\pm\! 0.1$	PENNER	02C	DPWA	Multichannel	
$\Gamma(\Sigma K)/\Gamma_{\text{total}}$					Γ ₅ /Γ
	DOCUMENT ID		TECN	COMMENT	15/1
VALUE (%)	DOCUMENT ID	10:	TECN	COMMENT	
5±2	ANISOVICH			Multichannel	
• • • We do not use the following of		i, fits,	limits, e	etc. • • •	
1±1	PENNER	0 2C	DPWA	Multichannel	
$\Gamma(N\sigma)/\Gamma_{\text{total}}$					Γ_{10}/Γ
VALUE (%)	DOCUMENT ID		TECN	COMMENT	
4±3	SOKHOYAN	15A	DPWA	Multichannel	
$\Gamma(N(1520)\pi)/\Gamma_{total}$					Γ ₁₁ /Γ
VALUE (%)	DOCUMENT ID		TECN	COMMENT	-
15±8	SOKHOYAN	15A	DPWA	Multichannel	_
$\Gamma(N(1535)\pi)/\Gamma_{total}$					Γ ₁₂ /Γ
VALUE (%)	DOCUMENT ID		TECN	COMMENT	
7±3	GUTZ	14	DPWA	Multichannel	
$\Gamma(\Delta(1232)\pi$, <i>P</i> -wave)/ $\Gamma_{ ext{total}}$					Г8/Г
VALUE (%)	DOCUMENT ID		TECN	COMMENT	- 0/ -
		15^		Multichannel	
17 ± 8	SOKHOYAN	ACT	DEWA	iviuiticnannel	

VALUE (%)	DOCUMENT ID			-
33±12	SOKHOYAN	15A	DPWA	Multichannel
N(1900) PHOTON	N DECAY AMPL	ITUE	DES AT	THE POLE
$N(1900) \rightarrow p\gamma$, helicity-1,	/2 amplitude $A_{1/}$	' 2		
MODULUS ($GeV^{-1/2}$) PHASE (°)	DOCUMEN	T ID	TE	COMMENT COMMENT
0.026 ± 0.014 60 ± 35	SOKHOY	ΆN	15A D	PWA Multichannel
$N(1900) \rightarrow p\gamma$, helicity-3,	/2 amplitude A _{3/}	' 2		
MODULUS (GeV $^{-1/2}$) PHASE ($^{\circ}$)	DOCUMEN	T ID	TE	COMMENT
-0.070 ± 0.030 70 \pm 50	SOKHOY	ΆN	15A D	PWA Multichannel
N(1900) BREIT-W	ICNED DUOTOI	N DE		MDIITUDES
	_		CAIA	WIFLI I ODES
$N(1900) \rightarrow p\gamma$, helicity-1,	,	2		
$VALUE (GeV^{-1/2})$				
0.024 ± 0.014	SOKHOYAN	15A	DPWA	Multichannel
\\\/ \\		-		
• • • We do not use the following		s, fits,	limits, 6	etc. • • •
0.024 ± 0.014	GUTZ	s, fits,	limits, e	etc. • • • Multichannel
$0.024 \pm 0.014 \\ -0.008 \pm 0.001$	GUTZ SHKLYAR	s, fits, 14 13	limits, e DPWA DPWA	etc. • • • Multichannel Multichannel
0.024 ± 0.014	GUTZ SHKLYAR ANISOVICH	s, fits, 14 13 12A	limits, e DPWA DPWA DPWA	etc. • • • Multichannel Multichannel Multichannel
$0.024 \pm 0.014 \\ -0.008 \pm 0.001 \\ 0.026 \pm 0.015$	GUTZ SHKLYAR	s, fits, 14 13 12A 12A	DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel
$0.024 \pm 0.014 \\ -0.008 \pm 0.001 \\ 0.026 \pm 0.015 \\ 0.041 \pm 0.008$	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER	s, fits, 14 13 12A 12A 02D	DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ /	s, fits, 14 13 12A 12A 02D	DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) $\rightarrow p\gamma$, helicity-3	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ /	s, fits, 14 13 12A 12A 02D	DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, VALUE (GeV ^{-1/2})	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN	14 13 12A 12A 02D	DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, $\frac{VALUE (GeV^{-1/2})}{-0.067\pm0.030}$	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN ng data for average	14 13 12A 12A 02D '2	DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, VALUE (GeV ^{-1/2}) -0.067 ± 0.030 • • • We do not use the following support to the property of the proper	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN ng data for average GUTZ SHKLYAR	14 13 12A 12A 02D '2	DPWA DPWA DPWA DPWA DPWA DPWA TECN DPWA limits, 6	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, was the following properties of the pr	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN ng data for average GUTZ SHKLYAR ANISOVICH	14 13 12A 12A 02D 72 15A s, fits, 14 13 12A	DPWA DPWA DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel COMMENT Multichannel etc. • • • Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, NALUE (GeV ^{-1/2}) -0.067 ± 0.030 • • • We do not use the following the	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN ng data for average GUTZ SHKLYAR ANISOVICH SHRESTHA	14 13 12A 12A 02D 72 15A s, fits, 14 13 12A 12A	DPWA DPWA DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel COMMENT Multichannel etc. • • • Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, was the following properties of the pr	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN ng data for average GUTZ SHKLYAR ANISOVICH	14 13 12A 12A 02D 72 15A s, fits, 14 13 12A 12A	DPWA DPWA DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel COMMENT Multichannel etc. • • • Multichannel Multichannel Multichannel Multichannel
0.024 ± 0.014 -0.008 ± 0.001 0.026 ± 0.015 0.041 ± 0.008 -0.017 N(1900) \rightarrow $p\gamma$, helicity-3, NALUE (GeV ^{-1/2}) -0.067 ± 0.030 • • • We do not use the following the	GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER /2 amplitude A ₃ / DOCUMENT ID SOKHOYAN Ing data for average GUTZ SHKLYAR ANISOVICH SHRESTHA PENNER	14 13 12A 12A 02D 22 15A s, fits, 14 13 12A 12A 02D	DPWA DPWA DPWA DPWA DPWA DPWA DPWA DPWA	Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel COMMENT Multichannel etc. • • • Multichannel Multichannel Multichannel Multichannel Multichannel Multichannel

 -0.010 ± 0.004

-0.016

SHRESTHA

PENNER

12A DPWA Multichannel

02D DPWA Multichannel

$N(1900) \rightarrow n\gamma$, helicity-3/2 amplitude A_{3/2}

$VALUE~({ m GeV}^{-1/2})$	DOCUMENT ID		TECN	COMMENT
-0.060 ± 0.045	ANISOVICH	13 B	DPWA	Multichannel
• • • We do not use the following	data for averages	s, fits,	limits, e	etc. • • •
-0.011 ± 0.007	SHRESTHA	12A	DPWA	Multichannel
-0.002	PENNER	02 D	DPWA	Multichannel

N(1900) FOOTNOTES

N(1900) REFERENCES

DENISENKO SOKHOYAN GUTZ SVARC	16 15A 14 14	PL B755 97 EPJ A51 95 EPJ A50 74 PR C89 045205	I. Denisenko et al.V. Sokhoyan et al.E. Gutz et al.A. Svarc et al.	(CBELSA/TAPS Collab.) (CBELSA/TAPS Collab.)
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich et al.	
SHKLYAR	13	PR C87 015201	V. Shklyar, H. Lenske, U. Mose	l (GIES)
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich et al.	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	` (KSU)
NIKONOV	80	PL B662 245	V.A. Nikonov et al.	(Bonn, Gatchina)
SHKLYAR	05	PR C72 015210	V. Shklyar, H. Lenske, U. Mose	l (GIES)
PENNER	02C	PR C66 055211	G. Penner, U. Mosel	(GIES)
PENNER	02D	PR C66 055212	G. Penner, U. Mosel	(GIES)
HOEHLER	79	PDAT 12-1	G. Hohler et al.	(KÀRLT)

 $^{^{1}\,\}mathrm{Fit}$ to the amplitudes of HOEHLER 79.