

$N(1900) \ 3/2^+$  $I(J^P) = \frac{1}{2}(3/2^+)$  Status: \*\*\*\* **$N(1900)$  POLE POSITION****REAL PART**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>1900 to 1940 (<math>\approx</math> 1920) OUR ESTIMATE</b>			
1945 $\pm$ 35	ANISOVICH	17A	DPWA Multichannel
1928 $\pm$ 18 $\pm$ 2	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1912 $\pm$ 30	<sup>2</sup> ANISOVICH	17A	L+P $\gamma p, \pi^- p \rightarrow K \Lambda$
1910 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel
1910 $\pm$ 30	GUTZ	14	DPWA Multichannel
1910	SHKLYAR	13	DPWA Multichannel
1900 $\pm$ 30	ANISOVICH	12A	DPWA Multichannel
1895	SHRESTHA	12A	DPWA Multichannel

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.<sup>2</sup> Statistical error only.**−2×IMAGINARY PART**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>100 to 200 (<math>\approx</math> 150) OUR ESTIMATE</b>			
135 <sup>+</sup> <sub>−</sub> 70 30	ANISOVICH	17A	DPWA Multichannel
152 $\pm$ 40 $\pm$ 9	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
166 $\pm$ 30	<sup>2</sup> ANISOVICH	17A	L+P $\gamma p, \pi^- p \rightarrow K \Lambda$
280 $\pm$ 50	SOKHOYAN	15A	DPWA Multichannel
280 $\pm$ 50	GUTZ	14	DPWA Multichannel
173	SHKLYAR	13	DPWA Multichannel
200 <sup>+</sup> <sub>−</sub> 100 60	ANISOVICH	12A	DPWA Multichannel
100	SHRESTHA	12A	DPWA Multichannel

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.<sup>2</sup> Statistical error only. **$N(1900)$  ELASTIC POLE RESIDUE****MODULUS  $|r|$** 

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>2 to 6 (<math>\approx</math> 4) OUR ESTIMATE</b>			
4 $\pm$ 2	SOKHOYAN	15A	DPWA Multichannel
4 $\pm$ 1 $\pm$ 1	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
4 $\pm$ 2	GUTZ	14	DPWA Multichannel
10	SHKLYAR	13	DPWA Multichannel
3 $\pm$ 2	ANISOVICH	12A	DPWA Multichannel

<sup>1</sup> Fit to the amplitudes of HOEHLER 79.

**PHASE  $\theta$** 

<u>VALUE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>–50 to 10 (<math>\approx</math> – 20) OUR ESTIMATE</b>			
–10 $\pm$ 40	SOKHOYAN	15A	DPWA Multichannel
–29 $\pm$ 15 $\pm$ 2	<sup>1</sup> SVARC	14	L+P $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
–10 $\pm$ 40	GUTZ	14	DPWA Multichannel
–64	SHKLYAR	13	DPWA Multichannel
10 $\pm$ 35	ANISOVICH	12A	DPWA Multichannel
<sup>1</sup> Fit to the amplitudes of HOEHLER 79.			

 **$N(1900)$  INELASTIC POLE RESIDUE**

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

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow N\eta$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.05 $\pm$ 0.02	70 $\pm$ 60	ANISOVICH	12A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow \Lambda K$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.03 $\pm$ 0.02	90 $\pm$ 40	ANISOVICH	17A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.07 $\pm$ 0.03	135 $\pm$ 25	ANISOVICH	12A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow \Sigma K$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.04 $\pm$ 0.02	110 $\pm$ 30	ANISOVICH	12A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow N(1535)\pi$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.04 $\pm$ 0.01	170 $\pm$ 30	GUTZ	14	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow \Delta(1232)\pi$ , *P*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.07 $\pm$ 0.04	–65 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow \Delta(1232)\pi$ , *F*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.10 $\pm$ 0.05	80 $\pm$ 30	SOKHOYAN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow N(1520)\pi$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.07 $\pm$ 0.04	–105 $\pm$ 35	SOKHOYAN	15A	DPWA Multichannel

**Normalized residue in  $N\pi \rightarrow N(1900) \rightarrow N\sigma$** 

<u>MODULUS</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.03±0.02	-110 ± 35	SOKHOYAN	15A DPWA	Multichannel

 **$N(1900)$  BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1890 to 1950 (<math>\approx</math> 1920) OUR ESTIMATE</b>			
1910±30	SOKHOYAN	15A DPWA	Multichannel
1998±3	<sup>1</sup> SHKLYAR	13 DPWA	Multichannel
1900±8	<sup>1</sup> SHRESTHA	12A DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1910±30	GUTZ	14 DPWA	Multichannel
1905±30	ANISOVICH	12A DPWA	Multichannel
1951±53	PENNER	02C DPWA	Multichannel

<sup>1</sup>Statistical error only. **$N(1900)$  BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>100 to 320 (<math>\approx</math> 200) OUR ESTIMATE</b>			
270±50	SOKHOYAN	15A DPWA	Multichannel
359±10	<sup>1</sup> SHKLYAR	13 DPWA	Multichannel
101±15	<sup>1</sup> SHRESTHA	12A DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
270±50	GUTZ	14 DPWA	Multichannel
250 <sup>+120</sup> <sub>-50</sub>	ANISOVICH	12A DPWA	Multichannel
622±42	PENNER	02C DPWA	Multichannel

<sup>1</sup>Statistical error only. **$N(1900)$  DECAY MODES**

	<u>Mode</u>	<u>Fraction (<math>\Gamma_i/\Gamma</math>)</u>
$\Gamma_1$	$N\pi$	1–20 %
$\Gamma_2$	$N\eta$	2–14 %
$\Gamma_3$	$N\eta'$	4–8 %
$\Gamma_4$	$N\omega$	7–13 %
$\Gamma_5$	$\Lambda K$	2–20 %
$\Gamma_6$	$\Sigma K$	3–7 %
$\Gamma_7$	$N\pi\pi$	40–80 %
$\Gamma_8$	$\Delta(1232)\pi$	30–70 %
$\Gamma_9$	$\Delta(1232)\pi$ , $P$ -wave	9–25 %
$\Gamma_{10}$	$\Delta(1232)\pi$ , $F$ -wave	21–45 %

$\Gamma_{11}$	$\Lambda K^*(892)$	< 0.2 %
$\Gamma_{12}$	$N\sigma$	1–7 %
$\Gamma_{13}$	$N(1520)\pi$	7–23 %
$\Gamma_{14}$	$N(1535)\pi$	4–10 %
$\Gamma_{15}$	$p\gamma$	0.001–0.025 %
$\Gamma_{16}$	$p\gamma$ , helicity=1/2	0.001–0.021 %
$\Gamma_{17}$	$p\gamma$ , helicity=3/2	<0.003 %
$\Gamma_{18}$	$n\gamma$	<0.040 %
$\Gamma_{19}$	$n\gamma$ , helicity=1/2	<0.007 %
$\Gamma_{20}$	$n\gamma$ , helicity=3/2	<0.033 %

### **$N(1900)$ BRANCHING RATIOS**

#### **$\Gamma(N\pi)/\Gamma_{\text{total}}$ $\Gamma_1/\Gamma$**

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2 to 20 (<math>\approx 10</math>) OUR ESTIMATE</b>			
$3\pm 2$	SOKHOYAN	15A	DPWA Multichannel
$25\pm 1$	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
$7\pm 4$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$3\pm 2$	GUTZ	14	DPWA Multichannel
$3\pm 2$	ANISOVICH	12A	DPWA Multichannel
$16\pm 2$	PENNER	02C	DPWA Multichannel
<sup>1</sup> Statistical error only.			

#### **$\Gamma(N\eta)/\Gamma_{\text{total}}$ $\Gamma_2/\Gamma$**

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$2\pm 2$	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
$10\pm 4$	ANISOVICH	12A	DPWA Multichannel
< 1	SHRESTHA	12A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$14\pm 5$	PENNER	02C	DPWA Multichannel
<sup>1</sup> Statistical error only.			

#### **$\Gamma(N\eta')/\Gamma_{\text{total}}$ $\Gamma_3/\Gamma$**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.06\pm 0.02$	ANISOVICH	17C	DPWA Multichannel

#### **$\Gamma(N\omega)/\Gamma_{\text{total}}$ $\Gamma_4/\Gamma$**

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$15\pm 8$	DENISENKO	16	DPWA Multichannel
$10\pm 3$	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$39\pm 9$	PENNER	02C	DPWA Multichannel
<sup>1</sup> Statistical error only.			

$\Gamma(\Lambda K)/\Gamma_{\text{total}}$					$\Gamma_5/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
16 $\pm$ 5	ANISOVICH	12A	DPWA	Multichannel	
14 $\pm$ 5	<sup>1</sup> SHRESTHA	12A	DPWA	Multichannel	
2.4 $\pm$ 0.3	<sup>1</sup> SHKLYAR	05	DPWA	Multichannel	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
5 to 15	NIKONOV	08	DPWA	Multichannel	
0.1 $\pm$ 0.1	PENNER	02C	DPWA	Multichannel	
<sup>1</sup> Statistical error only.					

$\Gamma(\Sigma K)/\Gamma_{\text{total}}$					$\Gamma_6/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
5 $\pm$ 2	ANISOVICH	12A	DPWA	Multichannel	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
1 $\pm$ 1	PENNER	02C	DPWA	Multichannel	

$\Gamma(\Lambda K^*(892))/\Gamma_{\text{total}}$					$\Gamma_{11}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
< 0.002	ANISOVICH	17B	DPWA	Multichannel	

$\Gamma(N\sigma)/\Gamma_{\text{total}}$					$\Gamma_{12}/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
4 $\pm$ 3	SOKHOYAN	15A	DPWA	Multichannel	

$\Gamma(N(1520)\pi)/\Gamma_{\text{total}}$					$\Gamma_{13}/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
15 $\pm$ 8	SOKHOYAN	15A	DPWA	Multichannel	

$\Gamma(N(1535)\pi)/\Gamma_{\text{total}}$					$\Gamma_{14}/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
7 $\pm$ 3	GUTZ	14	DPWA	Multichannel	

$\Gamma(\Delta(1232)\pi, P\text{-wave})/\Gamma_{\text{total}}$					$\Gamma_9/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
17 $\pm$ 8	SOKHOYAN	15A	DPWA	Multichannel	

$\Gamma(\Delta(1232)\pi, F\text{-wave})/\Gamma_{\text{total}}$					$\Gamma_{10}/\Gamma$
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>		
33 $\pm$ 12	SOKHOYAN	15A	DPWA	Multichannel	

## N(1900) PHOTON DECAY AMPLITUDES AT THE POLE

### N(1900) $\rightarrow p\gamma$ , helicity-1/2 amplitude $A_{1/2}$

<u>MODULUS (<math>\text{GeV}^{-1/2}</math>)</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.026 $\pm$ 0.014	60 $\pm$ 35	SOKHOYAN	15A	DPWA Multichannel

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

<u>MODULUS (<math>\text{GeV}^{-1/2}</math>)</u>	<u>PHASE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.070 \pm 0.030$	$70 \pm 50$	SOKHOYAN	15A	DPWA Multichannel

 **$N(1900)$  BREIT-WIGNER PHOTON DECAY AMPLITUDES** **$N(1900) \rightarrow p\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.024 \pm 0.014$	SOKHOYAN	15A	DPWA Multichannel
$-0.008 \pm 0.001$	<sup>1</sup> SHKLYAR	13	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$0.024 \pm 0.014$	GUTZ	14	DPWA Multichannel
$0.026 \pm 0.015$	ANISOVICH	12A	DPWA Multichannel
$0.041 \pm 0.008$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
$-0.017$	PENNER	02D	DPWA Multichannel

<sup>1</sup>Statistical error only. **$N(1900) \rightarrow p\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.067 \pm 0.030$	SOKHOYAN	15A	DPWA Multichannel
$< 0.001$	SHKLYAR	13	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.067 \pm 0.030$	GUTZ	14	DPWA Multichannel
$-0.065 \pm 0.030$	ANISOVICH	12A	DPWA Multichannel
$-0.004 \pm 0.006$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
$0.031$	PENNER	02D	DPWA Multichannel

<sup>1</sup>Statistical error only. **$N(1900) \rightarrow n\gamma$ , helicity-1/2 amplitude  $A_{1/2}$** 

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.000 \pm 0.030$	ANISOVICH	13B	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.010 \pm 0.004$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
$-0.016$	PENNER	02D	DPWA Multichannel

<sup>1</sup>Statistical error only. **$N(1900) \rightarrow n\gamma$ , helicity-3/2 amplitude  $A_{3/2}$** 

<u>VALUE (<math>\text{GeV}^{-1/2}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-0.060 \pm 0.045$	ANISOVICH	13B	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
$-0.011 \pm 0.007$	<sup>1</sup> SHRESTHA	12A	DPWA Multichannel
$-0.002$	PENNER	02D	DPWA Multichannel

<sup>1</sup>Statistical error only.

## N(1900) REFERENCES

ANISOVICH	17A	PRL 119 062004	A.V. Anisovich <i>et al.</i>	
ANISOVICH	17B	PL B771 142	A.V. Anisovich <i>et al.</i>	
ANISOVICH	17C	PL B772 247	A.V. Anisovich <i>et al.</i>	
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.)
GUTZ	14	EPJ A50 74	E. Gutz <i>et al.</i>	(CBELSA/TAPS 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>	
SHKLYAR	13	PR C87 015201	V. Shklyar, H. Lenske, U. Mosel	(GIES)
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)
NIKONOV	08	PL B662 245	V.A. Nikonov <i>et al.</i>	(Bonn, Gatchina)
SHKLYAR	05	PR C72 015210	V. Shklyar, H. Lenske, U. Mosel	(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 <i>et al.</i>	(KARLT)

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