

$$N(1895) \ 1/2^-$$

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

was $N(2090)$

Before our 2012 *Review*, this state appeared in our Listings as the $N(2090)$. Any structure in the S_{11} wave above 1800 MeV is listed here. A few early results that are now obsolete have been omitted.

$N(1895)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1890 to 1930 ($\approx$ 1910) OUR ESTIMATE			
1907 $\pm$ 10	AFZAL	20	DPWA Multichannel
1895 $\pm$ 15	ANISOVICH	17A	DPWA Multichannel
1906 $\pm$ 17	¹ ANISOVICH	17A	L+P $\gamma p, \pi^- p \rightarrow K \Lambda$
1917 $\pm$ 19 $\pm$ 1	² SVARC	14	L+P $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1956	HUNT	19	DPWA Multichannel
1907 $\pm$ 10	ANISOVICH	17C	DPWA Multichannel
1907 $\pm$ 10	SOKHOYAN	15A	DPWA Multichannel
1900 $\pm$ 15	ANISOVICH	12A	DPWA Multichannel
1797 $\pm$ 26	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1795	VRANA	00	DPWA Multichannel
2150 $\pm$ 70	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

¹ Statistical error only.
² Fit to the amplitudes of HOEHLER 79.

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
80 to 140 ($\approx$ 110) OUR ESTIMATE			
100 ⁺ _{−10}	AFZAL	20	DPWA Multichannel
132 $\pm$ 30	ANISOVICH	17A	DPWA Multichannel
100 $\pm$ 10	¹ ANISOVICH	17A	L+P $\gamma p, \pi^- p \rightarrow K \Lambda$
101 $\pm$ 36 $\pm$ 1	^{1,2} SVARC	14	L+P $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
449	HUNT	19	DPWA Multichannel
100 ⁺ _{−10}	ANISOVICH	17C	DPWA Multichannel
100 ⁺ _{−15}	SOKHOYAN	15A	DPWA Multichannel
90 ⁺ _{−15}	ANISOVICH	12A	DPWA Multichannel
420 $\pm$ 45	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
220	VRANA	00	DPWA Multichannel
350 $\pm$ 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

¹ Statistical error only.
² Fit to the amplitudes of HOEHLER 79.

$N(1895)$ ELASTIC POLE RESIDUE**MODULUS $|r|$**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1 to 5 (≈ 3) OUR ESTIMATE			
3 ± 2	SOKHOYAN	15A	DPWA Multichannel
3.1 ± 1.4	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1 ± 1	ANISOVICH	12A	DPWA Multichannel
60	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
40 ± 20	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
¹ Fit to the amplitudes of HOEHLER 79.			

PHASE θ

VALUE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
125 ± 45	SOKHOYAN	15A	DPWA Multichannel
$-107 \pm 23 \pm 2$	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
0 ± 90	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-164	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
¹ Fit to the amplitudes of HOEHLER 79.			

 $N(1895)$ INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \rightarrow N(1895) \rightarrow \Lambda K$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.09 ± 0.03	8 ± 30	ANISOVICH	17A	DPWA Multichannel
0.06 ± 0.02	87 ± 27	¹ ANISOVICH	17A	L+P $\gamma p, \pi^- p \rightarrow K\Lambda$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.05 ± 0.02	-90 ± 30	ANISOVICH	12A	DPWA Multichannel
¹ Statistical error only.				

Normalized residue in $N\pi \rightarrow N(1895) \rightarrow \Sigma K$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.06 ± 0.02	40 ± 30	ANISOVICH	12A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow N(1895) \rightarrow \Delta(1232)\pi$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.05 ± 0.025	-100 ± 45	SOKHOYAN	15A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow N(1895) \rightarrow N(1440)\pi$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.05 ± 0.025	-100 ± 45	SOKHOYAN	15A	DPWA Multichannel

N(1895) BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1870 to 1920 ($\approx$ 1895) OUR ESTIMATE			
2000 $\pm$ 29	¹ HUNT	19	DPWA Multichannel
1890 ⁺⁹ ₋₂₃	KASHEVAROV	17	DPWA $\gamma p \rightarrow \eta p, \eta' p$
1905 $\pm$ 12	SOKHOYAN	15A	DPWA Multichannel
1880 $\pm$ 20	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1895 $\pm$ 15	ANISOVICH	12A	DPWA Multichannel
1910 $\pm$ 15	¹ SHRESTHA	12A	DPWA Multichannel
1812 $\pm$ 25	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
1822 $\pm$ 43	VRANA	00	DPWA Multichannel
2180 $\pm$ 80	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
¹ Statistical error only.			

N(1895) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
80 to 200 ($\approx$ 120) OUR ESTIMATE			
466 $\pm$ 72	¹ HUNT	19	DPWA Multichannel
150 $\pm$ 57	KASHEVAROV	17	DPWA $\gamma p \rightarrow \eta p, \eta' p$
100 ⁺³⁰ ₋₁₀	SOKHOYAN	15A	DPWA Multichannel
95 $\pm$ 30	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
90 ⁺³⁰ ₋₁₅	ANISOVICH	12A	DPWA Multichannel
502 $\pm$ 47	¹ SHRESTHA	12A	DPWA Multichannel
405 $\pm$ 40	BATINIC	10	DPWA $\pi N \rightarrow N\pi, N\eta$
248 $\pm$ 185	VRANA	00	DPWA Multichannel
350 $\pm$ 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
¹ Statistical error only.			

N(1895) DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	2–18 %
Γ_2 $N\eta$	15–45 %
Γ_3 $N\eta'$	10–40 %
Γ_4 $N\omega$	16–40 %
Γ_5 ΛK	3–23 %
Γ_6 ΣK	6–20 %
Γ_7 $N\pi\pi$	17–74 %
Γ_8 $\Delta(1232)\pi$, D -wave	3–11 %
Γ_9 $N\rho$	14–50 %
Γ_{10} $N\rho$, $S=1/2$, S -wave	<18 %

Γ_{11}	$N\rho, S=3/2, D\text{-wave}$	14–32 %
Γ_{12}	$N\sigma$	<13 %
Γ_{13}	$N(1440)\pi$	2–12 %
Γ_{14}	$\Lambda K^*(892)$	4–9 %
Γ_{15}	$p\gamma$, helicity=1/2	0.01–0.06 %
Γ_{16}	$n\gamma$, helicity=1/2	0.003–0.05 %

$N(1895)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$					Γ_1/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
2–18 % OUR ESTIMATE					
8 $\pm$ 4	¹ HUNT	19	DPWA	Multichannel	
2.5 $\pm$ 1.5	SOKHOYAN	15A	DPWA	Multichannel	
9 $\pm$ 5	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2 $\pm$ 1	ANISOVICH	12A	DPWA	Multichannel	
17 $\pm$ 2	¹ SHRESTHA	12A	DPWA	Multichannel	
32 $\pm$ 6	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$	
17 $\pm$ 3	VRANA	00	DPWA	Multichannel	
18 $\pm$ 8	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$	
¹ Statistical error only.					

$\Gamma(N\eta)/\Gamma_{\text{total}}$					Γ_2/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
15–45 % OUR ESTIMATE					
10 $\pm$ 5	MUELLER	20	DPWA	Multichannel	
37 $\pm$ 9	¹ HUNT	19	DPWA	Multichannel	
10 $\pm$ 5	ANISOVICH	17C	DPWA	Multichannel	
20 $\pm$ 6	² KASHEVAROV	17	DPWA	$\gamma p \rightarrow \eta p, \eta' p$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
21 $\pm$ 6	ANISOVICH	12A	DPWA	Multichannel	
40 $\pm$ 4	¹ SHRESTHA	12A	DPWA	Multichannel	
22 $\pm$ 10	BATINIC	10	DPWA	$\pi N \rightarrow N\pi, N\eta$	
41 $\pm$ 4	VRANA	00	DPWA	Multichannel	
¹ Statistical error only.					
² Assuming $A_{1/2} = -0.030 \text{ GeV}^{-1/2}$.					

$\Gamma(N\eta')/\Gamma_{\text{total}}$					Γ_3/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
10–40 % OUR ESTIMATE					
13 $\pm$ 5	ANISOVICH	17C	DPWA	Multichannel	
38 $\pm$ 20	¹ KASHEVAROV	17	DPWA	$\gamma p \rightarrow \eta p, \eta' p$	
¹ Assuming $A_{1/2} = -0.030 \text{ GeV}^{-1/2}$.					

$\Gamma(N\omega)/\Gamma_{\text{total}}$					Γ_4/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
16–40 % OUR ESTIMATE					
28 $\pm$ 12	DENISENKO	16	DPWA	Multichannel	

$\Gamma(\Lambda K)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
3–23 % OUR ESTIMATE			
7 ±4	¹ HUNT	19	DPWA Multichannel
18 ±5	ANISOVICH	12A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.8±0.8	¹ SHRESTHA	12A	DPWA Multichannel
¹ Statistical error only.			

$\Gamma(\Sigma K)/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
6–20 % OUR ESTIMATE			
13±7	ANISOVICH	12A	DPWA Multichannel

$\Gamma(\Delta(1232)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_8/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
3–11 % OUR ESTIMATE			
<10	¹ HUNT	19	DPWA Multichannel
7±4	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
7±3	¹ SHRESTHA	12A	DPWA Multichannel
1±1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

$\Gamma(N\rho, S=1/2, S\text{-wave})/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<18 % OUR ESTIMATE			
<18	¹ HUNT	19	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
< 2	¹ SHRESTHA	12A	DPWA Multichannel
36±1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

$\Gamma(N\rho, S=3/2, D\text{-wave})/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
14–32 % OUR ESTIMATE			
23±9	¹ HUNT	19	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
9±3	¹ SHRESTHA	12A	DPWA Multichannel
1±1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

$\Gamma(N\sigma)/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
<13 % OUR ESTIMATE			
<13	¹ HUNT	19	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
< 2	¹ SHRESTHA	12A	DPWA Multichannel
2±1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

$\Gamma(N(1440)\pi)/\Gamma_{\text{total}}$ Γ_{13}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
2–12 % OUR ESTIMATE			
7 ± 5	¹ HUNT	19	DPWA Multichannel
2.5 ± 1.5	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
24 ± 4	¹ SHRESTHA	12A	DPWA Multichannel
2 ± 1	VRANA	00	DPWA Multichannel
¹ Statistical error only.			

$\Gamma(\Lambda K^*(892))/\Gamma_{\text{total}}$ Γ_{14}/Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
4–9 % OUR ESTIMATE			
6.3 ± 2.5	ANISOVICH	17B	DPWA Multichannel

$N(1895)$ PHOTON DECAY AMPLITUDES AT THE POLE

$N(1895) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

MODULUS ($\text{GeV}^{-1/2}$)	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
−0.015 ± 0.006	−35 ± 35	ANISOVICH	17C	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.015 ± 0.006	145 ± 35	SOKHOYAN	15A	DPWA Multichannel

$N(1895) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

MODULUS ($\text{GeV}^{-1/2}$)	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
−0.015 ± 0.010	60 ± 25	ANISOVICH	17E	DPWA Multichannel

$N(1895)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

$N(1895) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($\text{GeV}^{-1/2}$)	DOCUMENT ID	TECN	COMMENT
0.017 ± 0.005	¹ HUNT	19	DPWA Multichannel
−0.016 ± 0.006	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.012 ± 0.006	¹ SHRESTHA	12A	DPWA Multichannel
¹ Statistical error only.			

$N(1895) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($\text{GeV}^{-1/2}$)	DOCUMENT ID	TECN	COMMENT
0.002 ± 0.013	¹ HUNT	19	DPWA Multichannel
−0.014 ± 0.010	ANISOVICH	17E	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.013 ± 0.006	ANISOVICH	13B	DPWA Multichannel
0.003 ± 0.007	¹ SHRESTHA	12A	DPWA Multichannel
¹ Statistical error only.			

***N*(1895) REFERENCES**

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	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>	
ANISOVICH	17E	PR C96 055202	A.V. Anisovich <i>et al.</i>	(BONN, PNPI, JLAB+)
KASHEVAROV	17	PRL 118 212001	V.L. Kashevarov <i>et al.</i>	(A2/MAMI Collab.)
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)
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)
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
