

$N(1860) 5/2^+$ $I(J^P) = \frac{1}{2}(5/2^+)$ Status: **

OMITTED FROM SUMMARY TABLE

Before the 2012 Review, all the evidence for a $J^P = 5/2^+$ state with a mass above 1800 MeV was filed under a two-star $N(2000)$. There is now some evidence from ANISOVICH 12A for two $5/2^+$ states in this region, so we have split the older data (according to mass) between two two-star $5/2^+$ states, an $N(1860)$ and an $N(2000)$.

 $N(1860)$ POLE POSITION**REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$1834 \pm 19 \pm 6$	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
1830^{+120}_{-60}	ANISOVICH	12A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1863	SHRESTHA	12A	DPWA Multichannel
1807	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

¹ Fit to the amplitudes of HOEHLER 79.**−2×IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$122 \pm 34 \pm 7$	² SVARC	14	L+P $\pi N \rightarrow \pi N$
250^{+150}_{-50}	ANISOVICH	12A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
189	SHRESTHA	12A	DPWA Multichannel
109	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

² Fit to the amplitudes of HOEHLER 79. **$N(1860)$ ELASTIC POLE RESIDUE****MODULUS $|r|$**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$4 \pm 1 \pm 1$	³ SVARC	14	L+P $\pi N \rightarrow \pi N$
50 ± 20	ANISOVICH	12A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
60	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

³ Fit to the amplitudes of HOEHLER 79.**PHASE θ**

<u>VALUE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$-39 \pm 18 \pm 9$	⁴ SVARC	14	L+P $\pi N \rightarrow \pi N$
-80 ± 40	ANISOVICH	12A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
-67	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

⁴ Fit to the amplitudes of HOEHLER 79.***N*(1860) BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1860 $+^{120}_{-60}$	ANISOVICH	12A	DPWA Multichannel
1900 ± 7	⁵ SHRESTHA	12A	DPWA Multichannel
1882 ± 10	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1817.7	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

⁵ Statistical error only.***N*(1860) BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
270 $+^{140}_{-50}$	ANISOVICH	12A	DPWA Multichannel
219 ± 23	⁶ SHRESTHA	12A	DPWA Multichannel
95 ± 20	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
117.6	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$

⁶ Statistical error only.***N*(1860) DECAY MODES**

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	4–20 %
Γ_2 $N\eta$	2–6 %
Γ_3 $N\pi\pi$	
Γ_4 $N\sigma$	35–47 %
Γ_5 $p\gamma$	
Γ_6 $p\gamma$, helicity=1/2	seen
Γ_7 $p\gamma$, helicity=3/2	seen
Γ_8 $n\gamma$	0.0017–0.062 %
Γ_9 $n\gamma$, helicity=1/2	0.0003–0.019 %
Γ_{10} $n\gamma$, helicity=3/2	0.0014–0.043 %

***N*(1860) BRANCHING RATIOS**

<u>$\Gamma(N\pi)/\Gamma_{\text{total}}$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_1/Γ</u>
20 ± 6	ANISOVICH	12A	DPWA Multichannel	
17 ± 1	⁷ SHRESTHA	12A	DPWA Multichannel	
4 ± 2	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
12.7	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	

⁷ Statistical error only.

$\Gamma(N\eta)/\Gamma_{\text{total}}$					Γ_2/Γ
VALUE (%)		DOCUMENT ID	TECN	COMMENT	
4 ± 2	⁸	SHRESTHA	12A	DPWA	Multichannel
⁸ Statistical error only.					

$\Gamma(N\sigma)/\Gamma_{\text{total}}$					Γ_4/Γ
VALUE (%)		DOCUMENT ID	TECN	COMMENT	
41 ± 6	⁹	SHRESTHA	12A	DPWA	Multichannel
⁹ Statistical error only.					

$N(1860)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

$N(1860) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($\text{GeV}^{-1/2}$)		DOCUMENT ID	TECN	COMMENT	
-0.017 ± 0.003	¹⁰	SHRESTHA	12A	DPWA	Multichannel
¹⁰ Statistical error only.					

$N(1860) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE		DOCUMENT ID	TECN	COMMENT	
0.029 ± 0.004	¹¹	SHRESTHA	12A	DPWA	Multichannel
¹¹ Statistical error only.					

$N(1860) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($\text{GeV}^{-1/2}$)		DOCUMENT ID	TECN	COMMENT	
0.021 ± 0.013		ANISOVICH	13B	DPWA	Multichannel
0.010 ± 0.005	¹²	SHRESTHA	12A	DPWA	Multichannel
¹² Statistical error only.					

$N(1860) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE ($\text{GeV}^{-1/2}$)		DOCUMENT ID	TECN	COMMENT	
0.034 ± 0.017		ANISOVICH	13B	DPWA	Multichannel
-0.009 ± 0.005	¹³	SHRESTHA	12A	DPWA	Multichannel
¹³ Statistical error only.					

$N(1860)$ REFERENCES

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)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT)