$N(1860)\ 5/2^+$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^+)$ 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

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$1834 \pm 19 \pm 6$	[1] SVARC	14	L+P	$\pi N \to \pi N$
1830^{+120}_{-60}	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1871	HUNT	19	DPWA	Multichannel
1807	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$

[1] Fit to the amplitudes of HOEHLER 79.

−2×IMAGINARY PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$122 \pm 34 \pm 7$	[2] SVARC	14	L+P	$\pi N \to \pi N$
250^{+150}_{-50}	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
337	HUNT	19	DPWA	Multichannel
109	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$

[2] Fit to the amplitudes of HOEHLER 79.

N(1860) ELASTIC POLE RESIDUE

MODULUS $|r|$

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

[3] Fit to the amplitudes of HOEHLER 79.

PHASE θ

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

[4] Fit to the amplitudes of HOEHLER 79.

N(1860) BREIT-WIGNER MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1928 ± 21	[5] HUNT	19	DPWA	Multichannel
$1860\ ^{+120}_{-\ 60}$	ANISOVICH	12A	DPWA	Multichannel
1882 ± 10	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1900 ± 7	[5] SHRESTHA	12A	DPWA	Multichannel
1817.7	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$

[5] Statistical error only.

N(1860) BREIT-WIGNER WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
376 ± 58	[6] HUNT	19	DPWA	Multichannel
$270\ ^{+140}_{-\ 50}$	ANISOVICH	12A	DPWA	Multichannel
95 ± 20	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
219 ± 23	[6] SHRESTHA	12A	DPWA	Multichannel
117.6	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$

[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	ΛK	
Γ_4	$N\pi\pi$	
Γ_5	$\Delta\pi$	
Γ_6	$\Delta\pi$, *P*-wave	
Γ_7	$\Delta\pi$, *F*-wave	
Γ_8	$N\rho$	
Γ_9	$N\rho$, S=3/2 , *P*-wave	
Γ_{10}	$N\rho$, S=3/2 , *F*-wave	
Γ_{11}	$N\sigma$	35–47 %
Γ_{12}	$p\gamma$	
Γ_{13}	$p\gamma$, helicity=1/2	seen
Γ_{14}	$p\gamma$, helicity=3/2	seen
Γ_{15}	$n\gamma$	0.0017–0.062 %
Γ_{16}	$n\gamma$, helicity=1/2	0.0003–0.019 %
Γ_{17}	$n\gamma$, helicity=3/2	0.0014–0.043 %

$N(1860)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$ Γ_1/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
8.0±0.1	[7] HUNT	19	DPWA	Multichannel
20 ±6	ANISOVICH	12A	DPWA	Multichannel
4 ±2	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
17 ±1	[7] SHRESTHA	12A	DPWA	Multichannel
12.7	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN

[7] Statistical error only.

$\Gamma(N\eta)/\Gamma_{total}$ Γ_2/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.11±0.09	[8] HUNT	19	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4 ±2	[8] SHRESTHA	12A	DPWA	Multichannel

[8] Statistical error only.

$\Gamma(\Lambda K)/\Gamma_{total}$ Γ_3/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
<0.01	[9] HUNT	19	DPWA	Multichannel

[9] Statistical error only.

$\Gamma(\Delta\pi, P\text{-wave})/\Gamma_{total}$ Γ_6/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
10±6	[10] HUNT	19	DPWA	Multichannel

[10] Statistical error only.

$\Gamma(\Delta\pi, F\text{-wave})/\Gamma_{total}$ Γ_7/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
27±11	[11] HUNT	19	DPWA	Multichannel

[11] Statistical error only.

$\Gamma(N\rho, S{=}3/2, P\text{-wave})/\Gamma_{total}$ Γ_9/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
<8.5	[12] HUNT	19	DPWA	Multichannel

[12] Statistical error only.

$\Gamma(N\rho, S{=}3/2, F\text{-wave})/\Gamma_{total}$ Γ_{10}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
<0.1	[13] HUNT	19	DPWA	Multichannel

[13] Statistical error only.

$\Gamma(N\sigma)/\Gamma_{total}$ Γ_{11}/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
51±10	[14] HUNT	19	DPWA	Multichannel

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

41± 6	[14] SHRESTHA	12A	DPWA	Multichannel

[14] Statistical error only.

N(1860) BREIT-WIGNER PHOTON DECAY AMPLITUDES

N(1860) → *pγ*, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.022±0.020	[15] HUNT	19	DPWA	Multichannel

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

−0.017±0.003	[15] SHRESTHA	12A	DPWA	Multichannel

[15] Statistical error only.

N(1860) → *pγ*, helicity-3/2 amplitude $A_{3/2}$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
−0.032±0.034	[16] HUNT	19	DPWA	Multichannel

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

0.029±0.004	[16] SHRESTHA	12A	DPWA	Multichannel

[16] Statistical error only.

N(1860) → *nγ*, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.021±0.029	[17] HUNT	19	DPWA	Multichannel
0.021±0.013	ANISOVICH	13B	DPWA	Multichannel

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

0.010±0.005	[17] SHRESTHA	12A	DPWA	Multichannel

[17] Statistical error only.

N(1860) → *nγ*, helicity-3/2 amplitude $A_{3/2}$

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.070±0.035	[18] HUNT	19	DPWA	Multichannel
0.034±0.017	ANISOVICH	13B	DPWA	Multichannel

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

−0.009±0.005	[18] SHRESTHA	12A	DPWA	Multichannel

[18] Statistical error only.

N(1860) REFERENCES

HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
SVARC	14	PR C89 045205	A. Svarc *et al.*	(RBI Zagreb, UNI Tuzla)
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich *et al.*	
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
ARNDT	06	PR C74 045205	R.A. Arndt *et al.*	(GWU)
HOEHLER	79	PDAT 12-1	G. Hohler *et al.*	(KARLT)