$N(2000)\ 5/2^+$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^+)$ 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(2000) BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1950 to 2150 (≈ 2050) OUR ESTIMATE				
1946±4	SHKLYAR	13	DPWA	Multichannel
2090±120	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2025	AYED	76	IPWA	$\pi N \rightarrow \pi N$
1970	[1] LANGBEIN	73	IPWA	$\pi N \rightarrow \Sigma K$ (sol. 2)
2175	ALMEHED	72	IPWA	$\pi N \rightarrow \pi N$
1930	DEANS	72	MPWA	$\gamma p \rightarrow \Lambda K$ (sol. D)

N(2000) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
198±2	SHKLYAR	13	DPWA	Multichannel
460±100	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
157	AYED	76	IPWA	$\pi N \rightarrow \pi N$
170	[1] LANGBEIN	73	IPWA	$\pi N \rightarrow \Sigma K$ (sol. 2)
150	ALMEHED	72	IPWA	$\pi N \rightarrow \pi N$
112	DEANS	72	MPWA	$\gamma p \rightarrow \Lambda K$ (sol. D)

N(2000) POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2030±110	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1900	SHKLYAR	13	DPWA	Multichannel
1779	ARNDT	04	DPWA	$\pi N \rightarrow \pi N$, ηN

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
480±100	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
123	SHKLYAR	13	DPWA	Multichannel
248	ARNDT	04	DPWA	$\pi N \rightarrow \pi N$, ηN

N(2000) ELASTIC POLE RESIDUE

MODULUS |r|

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
35^{+80}_{-15}	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
11	SHKLYAR	13	DPWA	Multichannel
47	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN

PHASE θ

VALUE (°)	DOCUMENT ID		TECN	COMMENT
-100 ± 40	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$-$ 6	SHKLYAR	13	DPWA	Multichannel
$-$ 61	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN

N(2000) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	(9.9 ± 1.0) %
Γ_2	$N\eta$	(2.0 ± 2.0) %
Γ_3	$N\omega$	(1.0 ± 1.0) %
Γ_4	ΛK	
Γ_5	ΣK	
Γ_6	$p\gamma$	

N(2000) BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
9.9±1.0 OUR AVERAGE				
10 ± 1	SHKLYAR	13	DPWA	Multichannel
9 ± 4	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8	AYED	76	IPWA	$\pi N \to \pi N$
25	ALMEHED	72	IPWA	$\pi N \to \pi N$

$\Gamma(N\eta)/\Gamma_{total}$ — Γ_2/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2±2	SHKLYAR	13	DWPA	Multichannel

$\Gamma(N\omega)/\Gamma_{total}$ — Γ_3/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1±1	SHKLYAR	13	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(2000) \rightarrow N\eta$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
+0.03	BAKER	79	DPWA	$\pi^- p \rightarrow n\eta$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(2000) \rightarrow \Lambda K$ — $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	SAXON	80	DPWA	$\pi^- p \rightarrow \Lambda K^0$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(2000) \rightarrow \Sigma K$ — $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
0.022	[2] DEANS	75	DPWA	$\pi N \rightarrow \Sigma K$
0.05	[1] LANGBEIN	73	IPWA	$\pi N \rightarrow \Sigma K$ (sol. 2)

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $p\gamma \rightarrow N(2000) \rightarrow \Lambda K$ — $(\Gamma_6\Gamma_4)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
0.0022	DEANS	72	MPWA	$\gamma p \rightarrow \Lambda K$ (sol. D)

N(2000) PHOTON DECAY AMPLITUDES

Papers on γN amplitudes predating 1981 may be found in our 2006 edition, Journal of Physics (generic for all A,B,E,G) **G33** 1 (2006).

$N(2000) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.035 ± 0.015	[3] ANISOVICH	12A	DPWA	Phase = $(15 \pm 40)^\circ$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.011 ± 0.001	SHKLYAR	13	DPWA	Multichannel

$N(2000) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.050 ± 0.014	[3] ANISOVICH	12A	DPWA	Phase = $(-130 \pm 40)^\circ$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.025 ± 0.001	SHKLYAR	13	DPWA	Multichannel

N(2000) FOOTNOTES

[1] Not seen in solution 1 of LANGBEIN 73.
[2] Value given is from solution 1 of DEANS 75; not present in solutions 2, 3, or 4.
[3] This ANISOVICH 12A value is the complex helicity amplitude at the pole position.

N(2000) REFERENCES

SHKLYAR	13	PR C87 015201	V. Shklyar, H. Lenske, U. Mosel	(GIES)
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)
PDG	06	JP G33 1	W.-M. Yao *et al.*	(PDG Collab.)
ARNDT	04	PR C69 035213	R.A. Arndt *et al.*	(GWU, TRIU)
SAXON	80	NP B162 522	D.H. Saxon *et al.*	(RHEL, BRIS) IJP
BAKER	79	NP B156 93	R.D. Baker *et al.*	(RHEL) IJP
AYED	76	Thesis CEA-N-1921	R. Ayed	(SACL) IJP
DEANS	75	NP B96 90	S.R. Deans *et al.*	(SFLA, ALAH) IJP
LANGBEIN	73	NP B53 251	W. Langbein, F. Wagner	(MUNI) IJP
ALMEHED	72	NP B40 157	S. Almehed, C. Lovelace	(LUND, RUTG) IJP
DEANS	72	PR D6 1906	S.R. Deans *et al.*	(SFLA) IJP