NODE=B005

$N(2060)\ 5/2^-$

$I(J^P) = \frac{1}{2}(\frac{5}{2}^-)$ Status: ∗∗∗

was $N(2200)$

Before our 2012 *Review*, this state appeared in our Listings as the $N(2200)$.

NODE=B005

$N(2060)$ POLE POSITION

NODE=B005215

REAL PART

NODE=B005RE
NODE=B005RE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2020 to 2130 (≈ 2070) OUR ESTIMATE				
2020±30	SARANTSEV	25	DPWA	Multichannel
2119±11±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
2100±60	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2010	HUNT	19	DPWA	Multichannel
2030±15	SOKHOYAN	15A	DPWA	Multichannel
2144±31	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B005RE;LINKAGE=SV

−2×IMAGINARY PART

NODE=B005IM
NODE=B005IM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
350 to 430 (≈ 400) OUR ESTIMATE				
410±50	SARANTSEV	25	DPWA	Multichannel
370±20±5	[1] SVARC	14	L+P	$\pi N \to \pi N$
360±80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
395	HUNT	19	DPWA	Multichannel
400±35	SOKHOYAN	15A	DPWA	Multichannel
438±13	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B005IM;LINKAGE=SV

$N(2060)$ ELASTIC POLE RESIDUE

NODE=B005220

MODULUS $|r|$

NODE=B005RER
NODE=B005RER

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
15 to 30 (≈ 20) OUR ESTIMATE				
25± 8	SOKHOYAN	15A	DPWA	Multichannel
19± 1±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
20±10	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
19± 5	ANISOVICH	12A	DPWA	Multichannel
26	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B005RER;LINKAGE=SV

PHASE θ

NODE=B005IMR
NODE=B005IMR

VALUE (°)	DOCUMENT ID		TECN	COMMENT
−130 to −90 (≈ −110) OUR ESTIMATE				
−130±20	SOKHOYAN	15A	DPWA	Multichannel
− 94± 5±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
− 90±50	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−125±20	ANISOVICH	12A	DPWA	Multichannel
− 71	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

→ UNCHECKED ←

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B005IMR;LINKAGE=SV

$N(2060)$ INELASTIC POLE RESIDUE

NODE=B005240

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

NODE=B005240

Normalized residue in $N\pi \to N(2060) \to N\eta$

NODE=B005RS1
NODE=B005RS1

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.05±0.03	40 ± 25	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \to N(2060) \to \Lambda K$ NODE=B005RS2

MODULUS	DOCUMENT ID		TECN	COMMENT	
0.01±0.005	ANISOVICH	12A	DPWA	Multichannel	NODE=B005RS2

Normalized residue in $N\pi \to N(2060) \to \Sigma K$ NODE=B005RS3

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT	
0.04±0.02	−70 ± 30	ANISOVICH	12A	DPWA	Multichannel	NODE=B005RS3

Normalized residue in $N\pi \to N(2060) \to \Delta(1232)\pi$, D-wave NODE=B005RS4

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT	
0.06±0.03	−90 ± 40	SOKHOYAN	15A	DPWA	Multichannel	NODE=B005RS4

Normalized residue in $N\pi \to N(2060) \to N\sigma$ NODE=B005RS5

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT	
0.12±0.06	80 ± 40	SOKHOYAN	15A	DPWA	Multichannel	NODE=B005RS5

Normalized residue in $N\pi \to N(2060) \to N(1440)\pi$ NODE=B005RS6

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT	
0.17±0.09	−60 ± 35	SOKHOYAN	15A	DPWA	Multichannel	NODE=B005RS6

Normalized residue in $N\pi \to N(2060) \to N(1520)\pi$, P-wave NODE=B005RS7

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT	
0.14±0.06	−45 ± 15	SOKHOYAN	15A	DPWA	Multichannel	NODE=B005RS7

N(2060) BREIT-WIGNER MASS

NODE=B005M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2030 to 2200 (≈ 2100) OUR ESTIMATE				
2040±30	SARANTSEV	25	DPWA	Multichannel
2111±17	[1] HUNT	19	DPWA	Multichannel
2180±80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
2228±30	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2045±15	SOKHOYAN	15A	DPWA	Multichannel
2116±21	[1] SHRESTHA	12A	DPWA	Multichannel
2217±27	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

NODE=B005M
→ UNCHECKED ←

[1] Statistical error only. NODE=B005M;LINKAGE=A

N(2060) BREIT-WIGNER WIDTH

NODE=B005W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
300 to 450 (≈ 400) OUR ESTIMATE				
420± 50	SARANTSEV	25	DPWA	Multichannel
499± 70	[1] HUNT	19	DPWA	Multichannel
400±100	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
310± 50	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
420± 30	SOKHOYAN	15A	DPWA	Multichannel
307±112	[1] SHRESTHA	12A	DPWA	Multichannel
481± 17	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

NODE=B005W
→ UNCHECKED ←

[1] Statistical error only. NODE=B005W;LINKAGE=A

N(2060) DECAY MODES

NODE=B005225;NODE=B005

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\pi$	7–12 %	DESIG=1;OUR EST
Γ_2	$N\eta$	2–38 %	DESIG=2
Γ_3	$N\omega$	1–7 %	DESIG=21;OUR EST
Γ_4	ΛK	10–20 %	DESIG=3
Γ_5	ΣK	1–5 %	DESIG=4;OUR EST
Γ_6	$N\pi\pi$	12–52 %	DESIG=5;OUR EST
Γ_7	$\Delta(1232)\pi$	(12.0±3.0) %	DESIG=26
Γ_8	$\Delta(1232)\pi$, D-wave	4–10 %	DESIG=7
Γ_9	$N\rho$	5–33 %	DESIG=8;OUR EST
Γ_{10}	$N\rho$, S=1/2		DESIG=9

Γ_{11}	$N\rho$, S=3/2 , D-wave	5–23 %	DESIG=23
Γ_{12}	$N\sigma$	3–9 %	DESIG=17;OUR EST
Γ_{13}	$N(1440)\pi$	4–14 %	DESIG=18;OUR EST
Γ_{14}	$N(1520)\pi$, P-wave	9–21 %	DESIG=19;OUR EST
Γ_{15}	$N(1680)\pi$, S-wave	8–22 %	DESIG=20;OUR EST
Γ_{16}	$\Lambda K^*(892)$	0.3–1.3 %	DESIG=22
Γ_{17}	$p\gamma$	0.03–0.19 %	DESIG=11;OUR EST
Γ_{18}	$p\gamma$, helicity=1/2	0.02–0.08 %	DESIG=12;OUR EST
Γ_{19}	$p\gamma$, helicity=3/2	0.01–0.10 %	DESIG=13;OUR EST
Γ_{20}	$n\gamma$	0.003–0.07 %	DESIG=14;OUR EST
Γ_{21}	$n\gamma$, helicity=1/2	0.001–0.02 %	DESIG=15;OUR EST
Γ_{22}	$n\gamma$, helicity=3/2	0.002–0.05 %	DESIG=16;OUR EST

N(2060) BRANCHING RATIOS

NODE=B005230

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=B005R1
NODE=B005R1

VALUE (%)	DOCUMENT ID		TECN	COMMENT
7 to 12 (≈ 10) OUR ESTIMATE				
11 ±2	SEIFEN	25	DPWA	Multichannel
5.3±1.4	[1] HUNT	19	DPWA	Multichannel
10 ±3	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
7 ±2	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
11 ±2	SOKHOYAN	15A	DPWA	Multichannel
9 ±2	[1] SHRESTHA	12A	DPWA	Multichannel
13 ±4	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

→ UNCHECKED ←

[1] Statistical error only.

NODE=B005R1;LINKAGE=A

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

NODE=B005R4
NODE=B005R4

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2–38 % OUR ESTIMATE				
6 ±2	MUELLER	20	DPWA	Multichannel
30 ±8	[1] HUNT	19	DPWA	Multichannel
4 ±2	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<$ 1	[1] SHRESTHA	12A	DPWA	Multichannel
0.2±1.0	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

→ UNCHECKED ←

[1] Statistical error only.

NODE=B005R4;LINKAGE=A

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

NODE=B005R00
NODE=B005R00

VALUE (%)	DOCUMENT ID		TECN	COMMENT
4±3	DENISENKO	16	DPWA	Multichannel

$\Gamma(\Lambda K)/\Gamma_{total}$ — Γ_4/Γ

NODE=B005R09
NODE=B005R09

VALUE (%)	DOCUMENT ID		TECN	COMMENT
10–20 % OUR ESTIMATE				
15±5	[1] HUNT	19	DPWA	Multichannel

→ UNCHECKED ←

[1] Statistical error only.

NODE=B005R09;LINKAGE=A

$\Gamma(\Sigma K)/\Gamma_{total}$ — Γ_5/Γ

NODE=B005R5
NODE=B005R5

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3±2	ANISOVICH	12A	DPWA	Multichannel

$\Gamma(\Delta(1232)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=B005R11
NODE=B005R11

VALUE (%)	DOCUMENT ID		TECN	COMMENT
12±3	SARANTSEV	25	DPWA	Multichannel

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

NODE=B005R01
NODE=B005R01

VALUE (%)	DOCUMENT ID		TECN	COMMENT
4–10 % OUR ESTIMATE				
12± 3	SARANTSEV	25	DPWA	Multichannel
9± 3	SEIFEN	25	DPWA	Multichannel
15± 6	[1] HUNT	19	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7± 3	SOKHOYAN	15A	DPWA	Multichannel
40±13	[1] SHRESTHA	12A	DPWA	Multichannel

→ UNCHECKED ←

[1] Statistical error only.

NODE=B005R01;LINKAGE=A

$\Gamma(N\rho)/\Gamma_{total}$ Γ_9/Γ

NODE=B005R12

VALUE (%)	DOCUMENT ID		TECN	COMMENT
28±11	SARANTSEV	25	DPWA	Multichannel

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

NODE=B005R02

VALUE (%)	DOCUMENT ID		TECN	COMMENT
24±10	SARANTSEV	25	DPWA	Multichannel
<10	[1] HUNT	19	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
21±15	[1] SHRESTHA	12A	DPWA	Multichannel

OCCUR=2

[1] Statistical error only.

NODE=B005R02;LINKAGE=A

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

NODE=B005R10

VALUE (%)	DOCUMENT ID		TECN	COMMENT
5–23 % OUR ESTIMATE				
4±4	SARANTSEV	25	DPWA	Multichannel
14±9	[1] HUNT	19	DPWA	Multichannel

→ UNCHECKED ←

[1] Statistical error only.

NODE=B005R10;LINKAGE=A

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

NODE=B005R04

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3±2	SARANTSEV	25	DPWA	Multichannel
5±3	SEIFEN	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6±3	SOKHOYAN	15A	DPWA	Multichannel

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

NODE=B005R05

VALUE (%)	DOCUMENT ID		TECN	COMMENT
8±5	SEIFEN	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
9±5	SOKHOYAN	15A	DPWA	Multichannel

$\Gamma(N(1520)\pi, P\text{-wave})/\Gamma_{total}$ Γ_{14}/Γ

NODE=B005R06

VALUE (%)	DOCUMENT ID		TECN	COMMENT
13±7	SEIFEN	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
15±6	SOKHOYAN	15A	DPWA	Multichannel

$\Gamma(N(1680)\pi, S\text{-wave})/\Gamma_{total}$ Γ_{15}/Γ

NODE=B005R07

VALUE (%)	DOCUMENT ID		TECN	COMMENT
14±5	SEIFEN	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
15±7	SOKHOYAN	15A	DPWA	Multichannel

$\Gamma(\Lambda K^*(892))/\Gamma_{total}$ Γ_{16}/Γ

NODE=B005R08

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0.3–1.3 % OUR ESTIMATE				
0.8±0.5	ANISOVICH	17B	DPWA	Multichannel

→ UNCHECKED ←

N(2060) PHOTON DECAY AMPLITUDES AT THE POLE

NODE=B005260

$N(2060) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B005PA1

MODULUS ($GeV^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.065±0.015	20 ± 10	SARANTSEV	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.064±0.010	12 ± 8	SOKHOYAN	15A	DPWA	Multichannel

$N(2060) \to p\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B005PA2

MODULUS ($GeV^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.030±0.020	160 ± 30	SARANTSEV	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.060±0.020	13 ± 10	SOKHOYAN	15A	DPWA	Multichannel

$N(2060) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B005PA3
NODE=B005PA3

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.052±0.025	−5 ± 20	ANISOVICH	17E	DPWA	Multichannel

$N(2060) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B005PA4
NODE=B005PA4

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.012±0.007	−40 ± 35	ANISOVICH	17E	DPWA	Multichannel

$N(2060)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

NODE=B005235

$N(2060) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B005A1
NODE=B005A1

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.065±0.015	SARANTSEV	25	DPWA	Multichannel
−0.019±0.005	[1] HUNT	19	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.062±0.010	SOKHOYAN	15A	DPWA	Multichannel
0.018±0.004	[1] SHRESTHA	12A	DPWA	Multichannel

[1] Statistical error only.

NODE=B005A1;LINKAGE=A

$N(2060) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B005A2
NODE=B005A2

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
−0.030±0.020	SARANTSEV	25	DPWA	Multichannel
0.039±0.005	[1] HUNT	19	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.062±0.020	SOKHOYAN	15A	DPWA	Multichannel
0.010±0.004	[1] SHRESTHA	12A	DPWA	Multichannel

[1] Statistical error only.

NODE=B005A2;LINKAGE=A

$N(2060) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B005A3
NODE=B005A3

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.069±0.017	[1] HUNT	19	DPWA	Multichannel
0.052±0.024	ANISOVICH	17E	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.025±0.011	ANISOVICH	13B	DPWA	Multichannel
−0.012±0.017	[1] SHRESTHA	12A	DPWA	Multichannel

[1] Statistical error only.

NODE=B005A3;LINKAGE=A

$N(2060) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B005A4
NODE=B005A4

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
−0.023±0.020	[1] HUNT	19	DPWA	Multichannel
0.012±0.007	ANISOVICH	17E	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.037±0.017	ANISOVICH	13B	DPWA	Multichannel
−0.023±0.023	[1] SHRESTHA	12A	DPWA	Multichannel

[1] Statistical error only.

NODE=B005A4;LINKAGE=A

$N(2060)$ REFERENCES

NODE=B005

SARANTSEV	25	PR C112 015202	A.V. Sarantsev *et al.*	(Bonn-Gatchina Collab.)	REFID=63294
SEIFEN	25	EPJ A61 173	T. Seifen *et al.*	(CBELSA/TAPS Collab.)	REFID=63593
MUELLER	20	PL B803 135323	J. Mueller *et al.*	(CBELSA/TAPS Collab.)	REFID=60391
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley		REFID=59985
ANISOVICH	17B	PL B771 142	A.V. Anisovich *et al.*		REFID=58101
ANISOVICH	17E	PR C96 055202	A.V. Anisovich *et al.*	(BONN, PNPI, JLAB+)	REFID=62311
DENISENKO	16	PL B755 97	I. Denisenko *et al.*		REFID=57504
SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan *et al.*	(CBELSA/TAPS Collab.)	REFID=56757
SVARC	14	PR C89 045205	A. Svarc *et al.*	(RBI Zagreb, UNI Tuzla)	REFID=55775
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich *et al.*		REFID=56147
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)	REFID=54041
SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)	REFID=54862
BATINIC	10	PR C82 038203	M. Batinic *et al.*	(ZAGR)	REFID=53552
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky *et al.*	(CMU, LBL) IJP	REFID=30064
Also		PR D20 2839	R.E. Cutkosky *et al.*	(CMU, LBL)	REFID=40096
HOEHLER	79	PDAT 12-1	G. Hohler *et al.*	(KARLT) IJP	REFID=30058
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP	REFID=30859