NODE=B015

$N(1720)\ 3/2^+$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^+)$ Status: ****

Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics C **38** 070001 (2014). NODE=B015

N(1720) POLE POSITION

NODE=B015215

REAL PART

NODE=B015RE
NODE=B015RE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1660 to 1690 (≈ 1675) OUR ESTIMATE				→ UNCHECKED ←
1670±25	SOKHOYAN	15A	DPWA	Multichannel
1677± 4±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
1666	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
1686	HOEHLER	93	SPED	$\pi N \to \pi N$
1680±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1670	SHKLYAR	13	DPWA	Multichannel
1660±30	ANISOVICH	12A	DPWA	Multichannel
1687	SHRESTHA	12A	DPWA	Multichannel
1691±23	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
1692	VRANA	00	DPWA	Multichannel

−2×IMAGINARY PART

NODE=B015IM
NODE=B015IM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
150 to 400 (≈ 250) OUR ESTIMATE				→ UNCHECKED ←
430±100	SOKHOYAN	15A	DPWA	Multichannel
184± 8±1	[1] SVARC	14	L+P	$\pi N \to \pi N$
355	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
187	HOEHLER	93	SPED	$\pi N \to \pi N$
120± 40	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
118	SHKLYAR	13	DPWA	Multichannel
450±100	ANISOVICH	12A	DPWA	Multichannel
175	SHRESTHA	12A	DPWA	Multichannel
233± 23	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
94	VRANA	00	DPWA	Multichannel

N(1720) ELASTIC POLE RESIDUE

NODE=B015220

MODULUS |*r*|

NODE=B015RER
NODE=B015RER

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
15± 8 OUR ESTIMATE				→ UNCHECKED ←
26±10	SOKHOYAN	15A	DPWA	Multichannel
13± 1	[1] SVARC	14	L+P	$\pi N \to \pi N$
25	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
15	HOEHLER	93	SPED	$\pi N \to \pi N$
8± 2	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
12	SHKLYAR	13	DPWA	Multichannel
22± 8	ANISOVICH	12A	DPWA	Multichannel
20	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

PHASE *θ*

NODE=B015IMR
NODE=B015IMR

VALUE (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
−130±30 OUR ESTIMATE				→ UNCHECKED ←
−100±25	SOKHOYAN	15A	DPWA	Multichannel
−115± 3±2	[1] SVARC	14	L+P	$\pi N \to \pi N$
− 94	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
−160±30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
− 45	SHKLYAR	13	DPWA	Multichannel
−115±30	ANISOVICH	12A	DPWA	Multichannel
−109	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$

$N(1720)$ INELASTIC POLE RESIDUE

NODE=B015250

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

NODE=B015250

Normalized residue in $N\pi \rightarrow N(1720) \rightarrow N\eta$

NODE=B015RS1
NODE=B015RS1

MODULUS	DOCUMENT ID		TECN	COMMENT
0.03±0.02	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1720) \rightarrow \Lambda K$

NODE=B015RS2
NODE=B015RS2

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.06±0.04	−150 ± 45	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1720) \rightarrow \Delta\pi$, P-wave

NODE=B015RS3
NODE=B015RS3

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.28±0.09	95 ± 30	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.29±0.08	80 ± 40	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1720) \rightarrow \Delta\pi$, F-wave

NODE=B015RS4
NODE=B015RS4

MODULUS	DOCUMENT ID		TECN	COMMENT
0.07±0.05	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.03±0.03	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1720) \rightarrow N\sigma$

NODE=B015RS5
NODE=B015RS5

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.08±0.04	−110 ± 35	SOKHOYAN	15A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1720) \rightarrow N(1520)\pi$, S-wave

NODE=B015RS6
NODE=B015RS6

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.05±0.04	undefined	SOKHOYAN	15A	DPWA	Multichannel

$N(1720)$ BREIT-WIGNER MASS

NODE=B015M

NODE=B015M

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1700 to 1750 (≈ 1720) OUR ESTIMATE				
1690 ± 30	SOKHOYAN	15A	DPWA	Multichannel
1700 ± 10	SHKLYAR	13	DPWA	Multichannel
1763.8± 4.6	ARNDT	06	DPWA	$\pi N \rightarrow \pi N$, ηN
1700 ± 50	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
1710 ± 20	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1690 $^{+70}_{-35}$	ANISOVICH	12A	DPWA	Multichannel
1720 ± 5	SHRESTHA	12A	DPWA	Multichannel
1720 ± 18	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$
1705 ± 10	PENNER	02C	DPWA	Multichannel
1716 ±112	VRANA	00	DPWA	Multichannel

$N(1720)$ BREIT-WIGNER WIDTH

NODE=B015W

NODE=B015W

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
150 to 400 (≈ 250) OUR ESTIMATE				
420± 80	SOKHOYAN	15A	DPWA	Multichannel
152± 2	SHKLYAR	13	DPWA	Multichannel
210± 22	ARNDT	06	DPWA	$\pi N \rightarrow \pi N$, ηN
125± 70	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
190± 30	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
420±100	ANISOVICH	12A	DPWA	Multichannel
200± 20	SHRESTHA	12A	DPWA	Multichannel
244± 28	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$
237± 73	PENNER	02C	DPWA	Multichannel
121± 39	VRANA	00	DPWA	Multichannel

$N(1720)$ DECAY MODES

NODE=B015225;NODE=B015

The following branching fractions are our estimates, not fits or averages.

NODE=B015

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\pi$	8–14 %	DESIG=1;OUR EST
Γ_2	$N\eta$	1–5 %	DESIG=2;OUR EST
Γ_3	ΛK	4–5 %	DESIG=3;OUR EST
Γ_4	$N\pi\pi$	50–90 %	DESIG=5;OUR EST
Γ_5	$\Delta(1232)\pi$		DESIG=181
Γ_6	$\Delta(1232)\pi$, P-wave	47–77 %	DESIG=6;OUR EST
Γ_7	$\Delta(1232)\pi$, F-wave	$<$12 %	DESIG=14;OUR EST
Γ_8	$N\rho$	70–85 %	DESIG=182;OUR EST
Γ_9	$N\rho$, S=1/2, P-wave	seen	DESIG=7;OUR EST
Γ_{10}	$N\sigma$	2–14 %	DESIG=9;OUR EST
Γ_{11}	$N(1440)\pi$	$<$2 %	DESIG=15;OUR EST
Γ_{12}	$N(1520)\pi$, S-wave	1–5 %	DESIG=16;OUR EST
Γ_{13}	$p\gamma$	0.05–0.25 %	DESIG=184;OUR EST
Γ_{14}	$p\gamma$, helicity=1/2	0.05–0.15 %	DESIG=10;OUR EST
Γ_{15}	$p\gamma$, helicity=3/2	0.002–0.16 %	DESIG=11;OUR EST
Γ_{16}	$n\gamma$	0.0–0.016 %	DESIG=185;OUR EST
Γ_{17}	$n\gamma$, helicity=1/2	0.0–0.01 %	DESIG=12;OUR EST
Γ_{18}	$n\gamma$, helicity=3/2	0.0–0.015 %	DESIG=13;OUR EST

$N(1720)$ BRANCHING RATIOS

NODE=B015230

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=B015R1
NODE=B015R1

VALUE (%)	DOCUMENT ID		TECN	COMMENT
11 ±3 OUR ESTIMATE				→ UNCHECKED ←
11 ±4	SOKHOYAN	15A	DPWA	Multichannel
17 ±2	SHKLYAR	13	DPWA	Multichannel
9.4±0.5	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
10 ±4	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
14 ±3	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10 ±5	ANISOVICH	12A	DPWA	Multichannel
13.6±0.6	SHRESTHA	12A	DPWA	Multichannel
18 ±3	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
17 ±2	PENNER	02C	DPWA	Multichannel
5 ±5	VRANA	00	DPWA	Multichannel

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

NODE=B015R11
NODE=B015R11

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0 ±1	SHKLYAR	13	DPWA	Multichannel
3 ±2	ANISOVICH	12A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<$ 1	SHRESTHA	12A	DPWA	Multichannel
0 ±1	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
10 ±7	THOMA	08	DPWA	Multichannel
0.2±0.2	PENNER	02C	DPWA	Multichannel
4 ±1	VRANA	00	DPWA	Multichannel

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

NODE=B015R13
NODE=B015R13

VALUE (%)	DOCUMENT ID		TECN	COMMENT
4.3±0.4	SHKLYAR	05	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.8±0.4	SHRESTHA	12A	DPWA	Multichannel
12 ±9	THOMA	08	DPWA	Multichannel
9 ±3	PENNER	02C	DPWA	Multichannel

$\Gamma(\Delta(1232)\pi, P\text{-wave})/\Gamma_{total}$ — Γ_6/Γ

NODE=B015R14
NODE=B015R14

VALUE (%)	DOCUMENT ID		TECN	COMMENT
62±15	SOKHOYAN	15A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
75±15	ANISOVICH	12A	DPWA	Multichannel

$\Gamma(\Delta(1232)\pi, F\text{-wave})/\Gamma_{total}$ — Γ_7/Γ

NODE=B015R16
NODE=B015R16

VALUE (%)	DOCUMENT ID		TECN	COMMENT
6±6	SOKHOYAN	15A	DPWA	Multichannel

$\Gamma(N\rho, S{=}1/2, P\text{-wave})/\Gamma_{total}$ — Γ_9/Γ

NODE=B015R12
NODE=B015R12

VALUE (%)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.4±0.5	SHRESTHA	12A	DPWA	Multichannel
91 ±1	VRANA	00	DPWA	Multichannel

$\Gamma(N\sigma)/\Gamma_{total}$ — Γ_{10}/Γ

NODE=B015R15
NODE=B015R15

VALUE (%)	DOCUMENT ID		TECN	COMMENT
8±6	SOKHOYAN	15A	DPWA	Multichannel

$\Gamma(N(1440)\pi)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=B015R17
NODE=B015R17

VALUE (%)	DOCUMENT ID		TECN	COMMENT
<2	SOKHOYAN	15A	DPWA	Multichannel

$\Gamma(N(1520)\pi, S\text{-wave})/\Gamma_{total}$ — Γ_{12}/Γ

NODE=B015R18
NODE=B015R18

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3±2	SOKHOYAN	15A	DPWA	Multichannel

$N(1720)$ PHOTON DECAY AMPLITUDES AT THE POLE

NODE=B015260

$N(1720) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B015PA1
NODE=B015PA1

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.115±0.045	0 ± 35	SOKHOYAN	15A	DPWA	Multichannel

$N(1720) \to p\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B015PA2
NODE=B015PA2

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.140±0.040	65 ± 35	SOKHOYAN	15A	DPWA	Multichannel

$N(1720)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

NODE=B015235

$N(1720) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B015A1
NODE=B015A1

→ UNCHECKED ←

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.100±0.020 OUR ESTIMATE				
0.115±0.045	SOKHOYAN	15A	DPWA	Multichannel
0.095±0.002	WORKMAN	12A	DPWA	$\gamma N \to N\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.065±0.002	SHKLYAR	13	DPWA	Multichannel
0.110±0.045	ANISOVICH	12A	DPWA	Multichannel
0.057±0.003	SHRESTHA	12A	DPWA	Multichannel
0.073	DRECHSEL	07	DPWA	$\gamma N \to \pi N$
0.097±0.003	DUGGER	07	DPWA	$\gamma N \to \pi N$
−0.053	PENNER	02D	DPWA	Multichannel

$N(1720) \to p\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B015A2
NODE=B015A2

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.135±0.040	SOKHOYAN	15A	DPWA	Multichannel
−0.048±0.002	WORKMAN	12A	DPWA	$\gamma N \to N\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.035±0.002	SHKLYAR	13	DPWA	Multichannel
0.150±0.030	ANISOVICH	12A	DPWA	Multichannel
−0.019±0.002	SHRESTHA	12A	DPWA	Multichannel
−0.011	DRECHSEL	07	DPWA	$\gamma N \to \pi N$
−0.039±0.003	DUGGER	07	DPWA	$\gamma N \to \pi N$
0.027	PENNER	02D	DPWA	Multichannel

$N(1720) \to n\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B015A3
NODE=B015A3

VALUE (GeV$^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
−0.080±0.050	ANISOVICH	13B	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.002±0.001	SHRESTHA	12A	DPWA	Multichannel
−0.003	DRECHSEL	07	DPWA	$\gamma N \to \pi N$
−0.004	PENNER	02D	DPWA	Multichannel

$N(1720) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B015A4
NODE=B015A4

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
-0.140 ± 0.065	ANISOVICH	13B	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.001 ± 0.002	SHRESTHA	12A	DPWA	Multichannel
-0.031	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$
0.003	PENNER	02D	DPWA	Multichannel

N(1720) FOOTNOTES

NODE=B015

[1] Fit to the amplitudes of HOEHLER 79.

NODE=B015RE;LINKAGE=SV

N(1720) REFERENCES

NODE=B015

For early references, see Physics Letters **111B** 1 (1982).

NODE=B015

SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan *et al.*	(CBELSA/TAPS Collab.)	REFID=56757
PDG	14	CPC 38 070001	K. Olive *et al.*	(PDG Collab.)	REFID=55687
SVARC	14	PR C89 045205	A. Svarc *et al.*		REFID=55775
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich *et al.*		REFID=56147
SHKLYAR	13	PR C87 015201	V. Shklyar, H. Lenske, U. Mosel	(GIES)	REFID=55104
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
WORKMAN	12A	PR C86 015202	R. Workman *et al.*	(GWU)	REFID=54335
BATINIC	10	PR C82 038203	M. Batinic *et al.*	(ZAGR)	REFID=53552
THOMA	08	PL B659 87	U. Thoma *et al.*	(CB-ELSA Collab.)	REFID=52087
DRECHSEL	07	EPJ A34 69	D. Drechsel, S.S. Kamalov, L. Tiator	(MAINZ, JINR)	REFID=52105
DUGGER	07	PR C76 025211	M. Dugger *et al.*	(JLab CLAS Collab.)	REFID=52039
ARNDT	06	PR C74 045205	R.A. Arndt *et al.*	(GWU)	REFID=51535
SHKLYAR	05	PR C72 015210	V. Shklyar, H. Lenske, U. Mosel	(GIES)	REFID=50977
PENNER	02C	PR C66 055211	G. Penner, U. Mosel	(GIES)	REFID=49129
PENNER	02D	PR C66 055212	G. Penner, U. Mosel	(GIES)	REFID=49130
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)	REFID=47593
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)	REFID=43821
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) IJP	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