

$N(1990) \ 7/2^+$

$$I(J^P) = \frac{1}{2}(\frac{7}{2}^+) \text{ Status: } **$$

OMITTED FROM SUMMARY TABLE

Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014).

NODE=B017

NODE=B017

$N(1990)$ POLE POSITION

NODE=B017215

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1861 ± 5	ROENCHEN 22	DPWA	Multichannel
2030 ± 65	ANISOVICH 12A	DPWA	Multichannel
1900 ± 30	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1913	HUNT 19	DPWA	Multichannel
1738	ROENCHEN 15A	DPWA	Multichannel
2301	VRANA 00	DPWA	Multichannel

NODE=B017RE
NODE=B017RE

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
72 ± 3	ROENCHEN 22	DPWA	Multichannel
240 ± 60	ANISOVICH 12A	DPWA	Multichannel
260 ± 60	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
163	HUNT 19	DPWA	Multichannel
188	ROENCHEN 15A	DPWA	Multichannel
202	VRANA 00	DPWA	Multichannel

NODE=B017IM
NODE=B017IM

$N(1990)$ ELASTIC POLE RESIDUE

NODE=B017220

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
0.16 ± 0.01	ROENCHEN 22	DPWA	Multichannel
2 ± 1	ANISOVICH 12A	DPWA	Multichannel
9 ± 3	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4.3	ROENCHEN 15A	DPWA	Multichannel

NODE=B017RER
NODE=B017RER

PHASE θ

VALUE (°)	DOCUMENT ID	TECN	COMMENT
−119 ± 2	ROENCHEN 22	DPWA	Multichannel
125 ± 65	ANISOVICH 12A	DPWA	Multichannel
−60 ± 30	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
−70	ROENCHEN 15A	DPWA	Multichannel

NODE=B017IMR
NODE=B017IMR

$\Delta(1990)$ INELASTIC POLE RESIDUE

NODE=B017240

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

NODE=B017240

Normalized residue in $N\pi \rightarrow N(1990) \rightarrow N\eta$

NODE=B017A00
NODE=B017A00

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.048 ± 0.001	−43 ± 2	ROENCHEN 22	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.013	−82	ROENCHEN 15A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1990) \rightarrow \Lambda K$

NODE=B017A01
NODE=B017A01

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.004 ± 0.001	133 ± 2	ROENCHEN 22	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.022	−111	ROENCHEN 15A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(1990) \rightarrow \Sigma K$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.010 ± 0.002	-54 ± 2	ROENCHEN	22 DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.005	24	ROENCHEN	15A DPWA	Multichannel

NODE=B017A02
 NODE=B017A02

 $N(1990)$ BREIT-WIGNER MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1950 to 2100 ($\approx$ 2020) OUR ESTIMATE			
2028 ± 19	¹ HUNT	19 DPWA	Multichannel
2060 ± 65	ANISOVICH	12A DPWA	Multichannel
1970 ± 50	CUTKOSKY	80 IPWA	$\pi N \rightarrow \pi N$
2005 ± 150	HOEHLER	79 IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1990 ± 45	¹ SHRESTHA	12A DPWA	Multichannel
2311 ± 16	VRANA	00 DPWA	Multichannel
¹ Statistical error only.			

NODE=B017M

NODE=B017M

→ UNCHECKED ←

NODE=B017M;LINKAGE=A

 $N(1990)$ BREIT-WIGNER WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
200 to 400 ($\approx$ 300) OUR ESTIMATE			
490 ± 110	¹ HUNT	19 DPWA	Multichannel
240 ± 50	ANISOVICH	12A DPWA	Multichannel
350 ± 120	CUTKOSKY	80 IPWA	$\pi N \rightarrow \pi N$
350 ± 100	HOEHLER	79 IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
203 ± 161	¹ SHRESTHA	12A DPWA	Multichannel
205 ± 72	VRANA	00 DPWA	Multichannel
¹ Statistical error only.			

NODE=B017W

NODE=B017W

→ UNCHECKED ←

NODE=B017W;LINKAGE=A

 $N(1990)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	2–6 %
Γ_2 $N\eta$	<3 %
Γ_3 ΛK	5.9–6.1 %
Γ_4 $p\gamma$	0.01–0.12%
Γ_5 $p\gamma$, helicity=1/2	0.003–0.042%
Γ_6 $p\gamma$, helicity=3/2	0.009–0.075 %
Γ_7 $n\gamma$	0.01–0.16 %
Γ_8 $n\gamma$, helicity=1/2	0.003–0.066 %
Γ_9 $n\gamma$, helicity=3/2	0.003–0.098 %

DESIG=1

DESIG=12

DESIG=13

DESIG=10;OUR EST

DESIG=6;OUR EST

DESIG=7;OUR EST

DESIG=11;OUR EST

DESIG=8;OUR EST

DESIG=9;OUR EST

NODE=B017230

NODE=B017R1
 NODE=B017R1

→ UNCHECKED ←

 $N(1990)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$	Γ_1/Γ			
<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
2-6 % OUR ESTIMATE				
1.9± 0.4	¹ HUNT	19	DPWA	Multichannel
2 ± 1	ANISOVICH	12A	DPWA	Multichannel
6 ± 2	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
4 ± 2	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
2 ± 1	¹ SHRESTHA	12A	DPWA	Multichannel
22 ±11	VRANA	00	DPWA	Multichannel
¹ Statistical error only.				

NODE=B017R1;LINKAGE=A

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

VALUE (%)

DOCUMENT ID

TECN

COMMENT

<3 % OUR ESTIMATE

1 ± 1

¹ MUELLER 20 DPWA Multichannel

1.7 ± 0.9

¹ HUNT 19 DPWA Multichannel¹ Statistical error only.

NODE=B017R00

NODE=B017R00

→ UNCHECKED ←

NODE=B017R00;LINKAGE=A

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

VALUE (%)

DOCUMENT ID

TECN

COMMENT

5.9-6.1 % OUR ESTIMATE

6.0 ± 0.1

¹ HUNT 19 DPWA Multichannel¹ Statistical error only.

NODE=B017R01

NODE=B017R01

→ UNCHECKED ←

NODE=B017R01;LINKAGE=A

N(1990) PHOTON DECAY AMPLITUDES AT THE POLE

NODE=B017260

N(1990) → pγ, helicity-1/2 amplitude A_{1/2}

NODE=B017PA1

NODE=B017PA1

MODULUS (GeV^{-1/2})

PHASE (°)

DOCUMENT ID

TECN

COMMENT

-0.030 ± 0.008

-135 ± 13

ROENCHEN 22 DPWA Multichannel

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

0.029

67

ROENCHEN 15A DPWA Multichannel

N(1990) → pγ, helicity-3/2 amplitude A_{3/2}

NODE=B017PA2

NODE=B017PA2

MODULUS (GeV^{-1/2})

PHASE (°)

DOCUMENT ID

TECN

COMMENT

-0.018 ± 0.006

53 ± 16

ROENCHEN 22 DPWA Multichannel

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

0.033

39

ROENCHEN 15A DPWA Multichannel

N(1990) → nγ, helicity-1/2 amplitude A_{1/2}

NODE=B017PA3

NODE=B017PA3

MODULUS (GeV^{-1/2})

PHASE (°)

DOCUMENT ID

TECN

COMMENT

-0.032 ± 0.015

5 ± 20

ANISOVICH 17E DPWA Multichannel

N(1990) → nγ, helicity-3/2 amplitude A_{3/2}

NODE=B017PA4

NODE=B017PA4

MODULUS (GeV^{-1/2})

PHASE (°)

DOCUMENT ID

TECN

COMMENT

-0.070 ± 0.025

0 ± 20

ANISOVICH 17E DPWA Multichannel

N(1990) BREIT-WIGNER PHOTON DECAY AMPLITUDES

NODE=B017235

N(1990) → pγ, helicity-1/2 amplitude A_{1/2}

NODE=B017A1

NODE=B017A1

VALUE (GeV^{-1/2})

DOCUMENT ID

TECN

COMMENT

0.006 ± 0.003

¹ HUNT 19 DPWA Multichannel

0.040 ± 0.012

ANISOVICH 12A DPWA Multichannel

¹ Statistical error only.

OCCUR=2

NODE=B017A1;LINKAGE=A

N(1990) → pγ, helicity-3/2 amplitude A_{3/2}

NODE=B017A2

NODE=B017A2

VALUE (GeV^{-1/2})

DOCUMENT ID

TECN

COMMENT

-0.055 ± 0.008

¹ HUNT 19 DPWA Multichannel

0.057 ± 0.012

ANISOVICH 12A DPWA Multichannel

¹ Statistical error only.

OCCUR=2

NODE=B017A2;LINKAGE=A

N(1990) → nγ, helicity-1/2 amplitude A_{1/2}

NODE=B017A3

NODE=B017A3

VALUE (GeV^{-1/2})

DOCUMENT ID

TECN

COMMENT

-0.027 ± 0.024

¹ HUNT 19 DPWA Multichannel

-0.032 ± 0.015

ANISOVICH 17E DPWA Multichannel

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

-0.045 ± 0.020

ANISOVICH 13B DPWA Multichannel

¹ Statistical error only.

NODE=B017A3;LINKAGE=A

N(1990) → nγ, helicity-3/2 amplitude A_{3/2}

NODE=B017A4

NODE=B017A4

VALUE (GeV^{-1/2})

DOCUMENT ID

TECN

COMMENT

0.051 ± 0.020

¹ HUNT 19 DPWA Multichannel

-0.072 ± 0.025

ANISOVICH 17E DPWA Multichannel

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

-0.052 ± 0.027

ANISOVICH 13B DPWA Multichannel

¹ Statistical error only.

NODE=B017A4;LINKAGE=A

N(1990) REFERENCESFor early references, see Physics Letters **111B** 1 (1982).

ROENCHEN	22	EPJ A58 229	D. Roenchen <i>et al.</i>	(JULI, GWU, BONN+)
MUELLER	20	PL B803 135323	J. Mueller <i>et al.</i>	(CBELSA/TAPS Collab.)
HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
ANISOVICH	17E	PR C96 055202	A.V. Anisovich <i>et al.</i>	(BONN, PNPI, JLAB+)
ROENCHEN	15A	EPJ A51 70	D. Roenchen <i>et al.</i>	
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
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)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman, T.-S.H. Lee	(PITT, ANL)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP

NODE=B017

NODE=B017

REFID=61999
 REFID=60391
 REFID=59985
 REFID=62311
 REFID=58183
 REFID=55687
 REFID=56147
 REFID=54041
 REFID=54862
 REFID=47593
 REFID=30064
 REFID=40096
 REFID=30058
 REFID=30859