NODE=B066

$N(1650)\ 1/2^-$

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

Most of the results published before 1975 were last included in our 1982 edition, Physics Letters **111B** 1 (1982). Some further obsolete results published before 1984 were last included in our 2006 edition, Journal of Physics, G **33** 1 (2006).

NODE=B066

N(1650) BREIT-WIGNER MASS

NODE=B066M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1645 to 1670 (≈ 1655) OUR ESTIMATE				
1651 ± 6	ANISOVICH	12A	DPWA	Multichannel
1634.7 ± 1.1	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
1650 ± 30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
1670 ± 8	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1664 ± 2	SHRESTHA	12A	DPWA	Multichannel
1680 ± 40	ANISOVICH	10	DPWA	Multichannel
1652 ± 9	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
1655 ± 15	THOMA	08	DPWA	Multichannel
1651.2 ± 4.7	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
1665 ± 2	PENNER	02C	DPWA	Multichannel
1647 ± 20	BAI	01B	BES	$J/\psi \to p\overline{p}\eta$
1689 ± 12	VRANA	00	DPWA	Multichannel
1677 ± 8	ARNDT	96	IPWA	$\gamma N \to \pi N$
1667	ARNDT	95	DPWA	$\pi N \to N\pi$
1712	[1] ARNDT	95	DPWA	$\pi N \to N\pi$
1674	LI	93	IPWA	$\gamma N \to \pi N$
1659 ± 9	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$
1672	MUSETTE	80	IPWA	$\pi^- p \to \Lambda K^0$
1680	SAXON	80	DPWA	$\pi^- p \to \Lambda K^0$
1700	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
1660	[3] LONGACRE	75	IPWA	$\pi N \to N\pi\pi$

NODE=B066M

NODE=B066M

→ UNCHECKED ←

OCCUR=2

N(1650) BREIT-WIGNER WIDTH

NODE=B066W

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
120 to 180 (≈ 150) OUR ESTIMATE				
104 ± 10	ANISOVICH	12A	DPWA	Multichannel
115.4 ± 2.8	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
167.9 ± 9.4	GREEN	97	DPWA	$\pi N \to \pi N$, ηN
150 ± 40	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
180 ± 20	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
126 ± 3	SHRESTHA	12A	DPWA	Multichannel
170 ± 45	ANISOVICH	10	DPWA	Multichannel
202 ± 16	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
180 ± 20	THOMA	08	DPWA	Multichannel
130.6 ± 7.0	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
138 ± 7	PENNER	02C	DPWA	Multichannel
$145\ ^{+80}_{-45}$	BAI	01B	BES	$J/\psi \to p\overline{p}\eta$
202 ± 40	VRANA	00	DPWA	Multichannel
160 ± 12	ARNDT	96	IPWA	$\gamma N \to \pi N$
90	ARNDT	95	DPWA	$\pi N \to N\pi$
184	[1] ARNDT	95	DPWA	$\pi N \to N\pi$
225	LI	93	IPWA	$\gamma N \to \pi N$
173 ± 12	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$
179	MUSETTE	80	IPWA	$\pi^- p \to \Lambda K^0$
120	SAXON	80	DPWA	$\pi^- p \to \Lambda K^0$
170	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
130	[3] LONGACRE	75	IPWA	$\pi N \to N\pi\pi$

NODE=B066W

NODE=B066W

→ UNCHECKED ←

OCCUR=2

$N(1650)$ POLE POSITION

NODE=B066215

REAL PART

NODE=B066RE
NODE=B066RE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1640 to 1670 (≈ 1655) OUR ESTIMATE				→ UNCHECKED ←
1647 ± 6	ANISOVICH	12A	DPWA	Multichannel
1648	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
1670	[4] HOEHLER	93	ARGD	$\pi N \to \pi N$
1640 ± 20	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1655	SHRESTHA	12A	DPWA	Multichannel
1670 ± 35	ANISOVICH	10	DPWA	Multichannel
1646 ± 8	BATINIC	10	DPWA	$\pi N \to N\pi, N\eta$
1645 ± 15	THOMA	08	DPWA	Multichannel
1653	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
1663	VRANA	00	DPWA	Multichannel
1660 ± 10	[5] ARNDT	98	DPWA	$\pi N \to \pi N, \eta N$
1673	ARNDT	95	DPWA	$\pi N \to N\pi$
1689	[1] ARNDT	95	DPWA	$\pi N \to N\pi$ OCCUR=2
1657	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90
1648 or 1651	[6] LONGACRE	78	IPWA	$\pi N \to N\pi\pi$
1699 or 1698	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$

−2×IMAGINARY PART

NODE=B066IM
NODE=B066IM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
100 to 170 (≈ 135) OUR ESTIMATE				→ UNCHECKED ←
103 ± 8	ANISOVICH	12A	DPWA	Multichannel
80	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
163	[4] HOEHLER	93	ARGD	$\pi N \to \pi N$
150 ± 30	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
123	SHRESTHA	12A	DPWA	Multichannel
170 ± 40	ANISOVICH	10	DPWA	Multichannel
204 ± 17	BATINIC	10	DPWA	$\pi N \to N\pi, N\eta$
187 ± 20	THOMA	08	DPWA	Multichannel
182	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
240	VRANA	00	DPWA	Multichannel
140 ± 20	[5] ARNDT	98	DPWA	$\pi N \to \pi N, \eta N$
82	ARNDT	95	DPWA	$\pi N \to N\pi$
192	[1] ARNDT	95	DPWA	$\pi N \to N\pi$ OCCUR=2
160	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90
117 or 119	[6] LONGACRE	78	IPWA	$\pi N \to N\pi\pi$
174 or 173	[2] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$

$N(1650)$ ELASTIC POLE RESIDUE

NODE=B066220

MODULUS $|r|$

NODE=B066RER
NODE=B066RER

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
20 to 50 (≈ 35) OUR ESTIMATE				→ UNCHECKED ←
24 ± 3	ANISOVICH	12A	DPWA	Multichannel
14	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
39	HOEHLER	93	ARGD	$\pi N \to \pi N$
60 ± 10	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
100	BATINIC	10	DPWA	$\pi N \to N\pi, N\eta$
69	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
22	ARNDT	95	DPWA	$\pi N \to N\pi$
72	[1] ARNDT	95	DPWA	$\pi N \to N\pi$ OCCUR=2
54	ARNDT	91	DPWA	$\pi N \to \pi N$ Soln SM90

PHASE θ

NODE=B066IMR
NODE=B066IMR

VALUE (°)	DOCUMENT ID		TECN	COMMENT
50 to 80 (≈ 70) OUR ESTIMATE				→ UNCHECKED ←
−75 ± 12	ANISOVICH	12A	DPWA	Multichannel
−69	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
−37	HOEHLER	93	ARGD	$\pi N \to \pi N$
−75 ± 25	CUTKOSKY	80	IPWA	$\pi N \to \pi N$

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

−65		BATINIC	10	DPWA $\pi N \to N\pi$, $N\eta$	
−55		ARNDT	04	DPWA $\pi N \to \pi N$, ηN	
29		ARNDT	95	DPWA $\pi N \to N\pi$	
−85	[1]	ARNDT	95	DPWA $\pi N \to N\pi$	OCCUR=2
−38		ARNDT	91	DPWA $\pi N \to \pi N$ Soln SM90	

$N(1650)$ INELASTIC POLE RESIDUE

NODE=B066250

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

NODE=B066250

Normalized residue in $N\pi \to N(1650) \to N\eta$

NODE=B066RS1
NODE=B066RS1

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
29±3	**134 ± 10**	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \to N(1650) \to \Lambda K$

NODE=B066RS2
NODE=B066RS2

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
23±9	**85 ± 9**	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \to N(1650) \to \Delta\pi$, D-wave

NODE=B066RS3
NODE=B066RS3

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
23±4	**−30 ± 20**	ANISOVICH	12A	DPWA	Multichannel

$N(1650)$ DECAY MODES

NODE=B066225;NODE=B066

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

NODE=B066

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\pi$	50–90 %	DESIG=1;OUR EST
Γ_2	$N\eta$	5–15 %	DESIG=2;OUR EST
Γ_3	ΛK	3–11 %	DESIG=3;OUR EST
Γ_4	ΣK		DESIG=4
Γ_5	$N\pi\pi$	10–20 %	DESIG=5;OUR EST
Γ_6	$\Delta\pi$	0–25 %	DESIG=181;OUR EST
Γ_7	$\Delta(1232)\pi$, D-wave	0–25 %	DESIG=6;OUR EST
Γ_8	$N\rho$	4–12 %	DESIG=182;OUR EST
Γ_9	$N\rho$, S=1/2, S-wave	(1.0±1.0) %	DESIG=7
Γ_{10}	$N\rho$, S=3/2, D-wave	(13.0±3.0) %	DESIG=8
Γ_{11}	$N(\pi\pi)^{I=0}_{S\text{-wave}}$	<4 %	DESIG=9;OUR EST
Γ_{12}	$N(1440)\pi$	<5 %	DESIG=10;OUR EST
Γ_{13}	$p\gamma$	0.04–0.20 %	DESIG=184;OUR EST
Γ_{14}	$p\gamma$, helicity=1/2	0.04–0.20 %	DESIG=11;OUR EST
Γ_{15}	$n\gamma$	0.003–0.17 %	DESIG=185;OUR EST
Γ_{16}	$n\gamma$, helicity=1/2	0.003–0.17 %	DESIG=12;OUR EST

$N(1650)$ BRANCHING RATIOS

NODE=B066230

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=B066R1
NODE=B066R1

VALUE (%)	DOCUMENT ID		TECN	COMMENT
50 to 90 (≈ 70) OUR ESTIMATE				→ UNCHECKED ←
51 ± 4	ANISOVICH	12A	DPWA	Multichannel
100	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
73.5± 1.1	GREEN	97	DPWA	$\pi N \to \pi N$, ηN
65 ±10	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
61 ± 4	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
57 ± 2	SHRESTHA	12A	DPWA	Multichannel
50 ±25	ANISOVICH	10	DPWA	Multichannel
79 ± 6	BATINIC	10	DPWA	$\pi N \to N\pi$, $N\eta$
70 ±15	THOMA	08	DPWA	Multichannel
100.0	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
65 ± 4	PENNER	02C	DPWA	Multichannel
74 ± 2	VRANA	00	DPWA	Multichannel
99	ARNDT	95	DPWA	$\pi N \to N\pi$
27 [1]	ARNDT	95	DPWA	$\pi N \to N\pi$ — OCCUR=2
89 ± 7	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$

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

NODE=B066R13
NODE=B066R13

VALUE (%)	DOCUMENT ID		TECN	COMMENT
5 to 15 OUR ESTIMATE				→ UNCHECKED ←
18 ±4	ANISOVICH	12A	DPWA	Multichannel
1.0±0.6	PENNER	02C	DPWA	Multichannel
6 ±1	VRANA	00	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
21 ±2	SHRESTHA	12A	DPWA	Multichannel
13 ±5	BATINIC	10	DPWA	$\pi N \rightarrow N\pi$, $N\eta$
15 ±6	THOMA	08	DPWA	Multichannel

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

NODE=B066R19
NODE=B066R19

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2.9±0.4 OUR AVERAGE Error includes scale factor of 1.2.				
10 ±5	ANISOVICH	12A	DPWA	Multichannel
4 ±1	SHKLYAR	05	DPWA	Multichannel
2.7±0.4	PENNER	02C	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8 ±1	SHRESTHA	12A	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1650) \rightarrow \Lambda K$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B066R3
NODE=B066R3

VALUE	DOCUMENT ID		TECN	COMMENT
−0.27 to −0.17 OUR ESTIMATE				→ UNCHECKED ←
−0.22	BELL	83	DPWA	$\pi^- p \rightarrow \Lambda K^0$
−0.22	SAXON	80	DPWA	$\pi^- p \rightarrow \Lambda K^0$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1650) \rightarrow \Sigma K$ — $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

NODE=B066R4
NODE=B066R4

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.254	LIVANOS	80	DPWA	$\pi p \rightarrow \Sigma K$

Note: Signs of couplings from $\pi N \rightarrow N\pi\pi$ analyses were changed in the 1986 edition to agree with the baryon-first convention; the overall phase ambiguity is resolved by choosing a negative sign for the $\Delta(1620)$ S_{31} coupling to $\Delta(1232)\pi$. NODE=B066310

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1650) \rightarrow \Delta(1232)\pi$, D-wave — $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

NODE=B066R5
NODE=B066R5

VALUE	DOCUMENT ID		TECN	COMMENT
+0.15 to 0.23 OUR ESTIMATE				→ UNCHECKED ←
+0.29	[2,7] LONGACRE	77	IPWA	$\pi N \rightarrow N\pi\pi$
+0.15	[3] LONGACRE	75	IPWA	$\pi N \rightarrow N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
+0.26±0.14	THOMA	08	DPWA	Multichannel
+0.12±0.04	MANLEY	92	IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$

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

NODE=B066R16
NODE=B066R16

VALUE (%)	DOCUMENT ID		TECN	COMMENT
0 to 25 OUR ESTIMATE				→ UNCHECKED ←
19±9	ANISOVICH	12A	DPWA	Multichannel
2±1	VRANA	00	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7±2	SHRESTHA	12A	DPWA	Multichannel
10±5	THOMA	08	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \rightarrow N(1650) \rightarrow N\rho$, S=1/2, S-wave — $(\Gamma_1\Gamma_9)^{1/2}/\Gamma$

NODE=B066R6
NODE=B066R6

VALUE	DOCUMENT ID		TECN	COMMENT
±0.03 to ±0.19 OUR ESTIMATE				→ UNCHECKED ←
+0.17	[2,7] LONGACRE	77	IPWA	$\pi N \rightarrow N\pi\pi$
−0.16	[3] LONGACRE	75	IPWA	$\pi N \rightarrow N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.01±0.09	MANLEY	92	IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$

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

NODE=B066R14
NODE=B066R14

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1±1	VRANA	00	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6±1	SHRESTHA	12A	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1650) \to N\rho$, S=3/2, D-wave $(\Gamma_1\Gamma_{10})^{1/2}/\Gamma$

NODE=B066R7
NODE=B066R7

VALUE	DOCUMENT ID		TECN	COMMENT
+0.17 to +0.29 OUR ESTIMATE				→ UNCHECKED ←
+0.29	[2,7] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
+0.16±0.06	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$

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

NODE=B066R15
NODE=B066R15

VALUE (%)	DOCUMENT ID		TECN	COMMENT
13±3	VRANA	00	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 1	SHRESTHA	12A	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1650) \to N(\pi\pi)^{I=0}_{S\text{-wave}}$ $(\Gamma_1\Gamma_{11})^{1/2}/\Gamma$

NODE=B066R8
NODE=B066R8

VALUE	DOCUMENT ID		TECN	COMMENT
+0.04 to +0.18 OUR ESTIMATE				→ UNCHECKED ←
0.00	[2,7] LONGACRE	77	IPWA	$\pi N \to N\pi\pi$
+0.25	[3] LONGACRE	75	IPWA	$\pi N \to N\pi\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
+0.12±0.08	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$

$\Gamma(N(\pi\pi)^{I=0}_{S\text{-wave}})/\Gamma_{total}$ Γ_{11}/Γ

NODE=B066R17
NODE=B066R17

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\pi \to N(1650) \to N(1440)\pi$ $(\Gamma_1\Gamma_{12})^{1/2}/\Gamma$

NODE=B066R9
NODE=B066R9

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
+0.11±0.06	MANLEY	92	IPWA	$\pi N \to \pi N$ & $N\pi\pi$

$\Gamma(N(1440)\pi)/\Gamma_{total}$ Γ_{12}/Γ

NODE=B066R18
NODE=B066R18

VALUE (%)	DOCUMENT ID		TECN	COMMENT
3±1	VRANA	00	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1	SHRESTHA	12A	DPWA	Multichannel

$N(1650)$ PHOTON DECAY AMPLITUDES

NODE=B066235

Papers on γN amplitudes predating 1981 may be found in our 2006 edition, Journal of Physics, G **33** 1 (2006).

NODE=B066235

$N(1650) \to p\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B066A1
NODE=B066A1

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
+0.053±0.016 OUR ESTIMATE				→ UNCHECKED ←
0.033±0.007	ANISOVICH	12A	DPWA	Multichannel
0.055±0.030	WORKMAN	12A	DPWA	$\gamma N \to N\pi$
0.022±0.007	DUGGER	07	DPWA	$\gamma N \to \pi N$
0.033±0.015	CRAWFORD	83	IPWA	$\gamma N \to \pi N$
0.050±0.010	AWAJI	81	DPWA	$\gamma N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.030±0.003	SHRESTHA	12A	DPWA	Multichannel
0.060±0.020	ANISOVICH	10	DPWA	Multichannel
0.100±0.035	[8] ANISOVICH	09A	DPWA	$\gamma d \to \eta N(N)$
0.033	DRECHSEL	07	DPWA	$\gamma N \to \pi N$
0.049	PENNER	02D	DPWA	Multichannel
0.069±0.005	ARNDT	96	IPWA	$\gamma N \to \pi N$
0.068±0.003	LI	93	IPWA	$\gamma N \to \pi N$
0.091	WADA	84	DPWA	Compton scattering

$N(1650) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B066A2
NODE=B066A2

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
−0.015±0.021 OUR ESTIMATE				→ UNCHECKED ←
−0.040±0.010	CHEN	12A	DPWA	$\gamma N \rightarrow \pi N$
−0.055±0.020	[9] ANISOVICH	09A	DPWA	$\gamma d \rightarrow \eta N(N)$
−0.008±0.004	AWAJI	81	DPWA	$\gamma N \rightarrow \pi N$
0.004±0.004	FUJII	81	DPWA	$\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.011±0.002	SHRESTHA	12A	DPWA	Multichannel
0.009	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$
−0.011	PENNER	02D	DPWA	Multichannel
−0.015±0.005	ARNDT	96	IPWA	$\gamma N \rightarrow \pi N$
−0.002±0.002	LI	93	IPWA	$\gamma N \rightarrow \pi N$

$N(1650)$ $\gamma p \rightarrow \Lambda K^+$ AMPLITUDES

NODE=B066240

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $p\gamma \rightarrow N(1650) \rightarrow \Lambda K^+$ (E_{0+} amplitude)

NODE=B066LK1
NODE=B066LK1

VALUE (units 10^{-3})	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
7.8 ±0.3	WORKMAN	90	DPWA
8.13	TANABE	89	DPWA

$p\gamma \rightarrow N(1650) \rightarrow \Lambda K^+$ phase angle θ (E_{0+} amplitude)

NODE=B066LP1
NODE=B066LP1

VALUE (degrees)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •			
−107 ±3	WORKMAN	90	DPWA
−107.8	TANABE	89	DPWA

$N(1650)$ FOOTNOTES

NODE=B066

[1] ARNDT 95 finds two distinct states. NODE=B066;LINKAGE=C

[2] LONGACRE 77 pole positions are from a search for poles in the unitarized T-matrix; the first (second) value uses, in addition to $\pi N \rightarrow N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis. The other LONGACRE 77 values are from eyeball fits with Breit-Wigner circles to the T-matrix amplitudes. NODE=B066;LINKAGE=L7

[3] From method II of LONGACRE 75: eyeball fits with Breit-Wigner circles to the T-matrix amplitudes. NODE=B066;LINKAGE=L5

[4] See HOEHLER 93 for a detailed discussion of the evidence for and the pole parameters of N and Δ resonances as determined from Argand diagrams of πN elastic partial-wave amplitudes and from plots of the speeds with which the amplitudes traverse the diagrams. NODE=B010;LINKAGE=H9

[5] ARNDT 98 also lists pole residues, which display more model dependence than do the associated pole positions. NODE=B066;LINKAGE=AA

[6] LONGACRE 78 values are from a search for poles in the unitarized T-matrix. The first (second) value uses, in addition to $\pi N \rightarrow N\pi\pi$ data, elastic amplitudes from a Saclay (CERN) partial-wave analysis. NODE=B066;LINKAGE=L8

[7] LONGACRE 77 considers this coupling to be well determined. NODE=B066;LINKAGE=X

[8] This ANISOVICH 09A amplitude is evaluated at the pole position; the phase is $(25 \pm 20)^\circ$. NODE=B066A1;LINKAGE=AN

[9] This ANISOVICH 09A amplitude is evaluated at the pole position; the phase is $(30 \pm 25)^\circ$. NODE=B066A2;LINKAGE=AN

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