

$\Delta(1940) 3/2^-$ $I(J^P) = \frac{3}{2}(\frac{3}{2}^-)$ Status: **

OMITTED FROM SUMMARY TABLE

 $\Delta(1940)$ POLE POSITION**REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1850 to 2050 (\approx 1950) OUR ESTIMATE			
2040 \pm 50	SOKHOYAN	15A	DPWA Multichannel
1878 \pm 11 \pm 5.5	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
1900 \pm 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2139	HUNT	19	DPWA Multichannel
2040 \pm 50	GUTZ	14	DPWA Multichannel
1990 $^{+100}_{-50}$	ANISOVICH	12A	DPWA Multichannel

¹Fit to the amplitudes of HOEHLER 79.**−2×IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
200 to 500 (\approx 350) OUR ESTIMATE			
450 \pm 90	SOKHOYAN	15A	DPWA Multichannel
212 \pm 21 \pm 6	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
200 \pm 60	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
400	HUNT	19	DPWA Multichannel
450 \pm 90	GUTZ	14	DPWA Multichannel
450 \pm 90	ANISOVICH	12A	DPWA Multichannel

¹Fit to the amplitudes of HOEHLER 79. **$\Delta(1940)$ ELASTIC POLE RESIDUE****MODULUS $|r|$**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
4 to 10 (\approx 7) OUR ESTIMATE			
6 \pm 3	SOKHOYAN	15A	DPWA Multichannel
9 \pm 1 \pm 1	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
8 \pm 3	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
4 \pm 3	GUTZ	14	DPWA Multichannel
4 \pm 4	ANISOVICH	12A	DPWA Multichannel

¹Fit to the amplitudes of HOEHLER 79.

PHASE θ

VALUE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
150 to 250 (\approx 200) OUR ESTIMATE			
– 90 \pm 35	SOKHOYAN	15A	DPWA Multichannel
140 \pm 7 \pm 7	¹ SVARC	14	L+P $\pi N \rightarrow \pi N$
135 \pm 45	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
– 50 \pm 35	GUTZ	14	DPWA Multichannel
¹ Fit to the amplitudes of HOEHLER 79.			

$\Delta(1940)$ INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \rightarrow \Delta(1940) \rightarrow \Delta(1232)\eta$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
<0.01	undefined	GUTZ	14	DPWA Multichannel

Normalized residue in $N\pi \rightarrow \Delta(1940) \rightarrow N(1535)\pi$

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
<0.03	undefined	GUTZ	14	DPWA Multichannel

Normalized residue in $N\pi \rightarrow \Delta(1940) \rightarrow \Delta(1232)\pi$, S-wave

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.12 \pm 0.06	120 \pm 45	SOKHOYAN	15A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow \Delta(1940) \rightarrow \Delta(1232)\pi$, D-wave

MODULUS	PHASE ($^{\circ}$)	DOCUMENT ID	TECN	COMMENT
0.06 \pm 0.04	– 80 \pm 35	SOKHOYAN	15A	DPWA Multichannel

$\Delta(1940)$ BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1940 to 2060 (\approx 2000) OUR ESTIMATE			
2137 \pm 13	¹ HUNT	19	DPWA Multichannel
2050 \pm 40	SOKHOYAN	15A	DPWA Multichannel
1940 \pm 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2050 \pm 40	GUTZ	14	DPWA Multichannel
1995 ⁺ _– 105 60	ANISOVICH	12A	DPWA Multichannel
¹ Statistical error only.			

$\Delta(1940)$ BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
300 to 500 (\approx 400) OUR ESTIMATE			
400 \pm 43	¹ HUNT	19	DPWA Multichannel
450 \pm 70	SOKHOYAN	15A	DPWA Multichannel
200 \pm 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			

$\Gamma(N\rho, S=3/2, S\text{-wave})/\Gamma_{\text{total}}$ Γ_6/Γ

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
75-85 % OUR ESTIMATE			
80±5	¹ HUNT	19	DPWA Multichannel

¹Statistical error only.

$\Gamma(N(1535)\pi)/\Gamma_{\text{total}}$ Γ_7/Γ

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2-14 % OUR ESTIMATE			
8±6	GUTZ	14	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2±1	HORN	08A	DPWA Multichannel

$\Gamma(Na_0(980))/\Gamma_{\text{total}}$ Γ_8/Γ

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
seen OUR ESTIMATE			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2±1	HORN	08A	DPWA Multichannel

$\Gamma(\Delta(1232)\eta)/\Gamma_{\text{total}}$ Γ_9/Γ

<u>VALUE (%)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
4-16 % OUR ESTIMATE			
10±6	GUTZ	14	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4±2	HORN	08A	DPWA Multichannel

$\Delta(1940)$ PHOTON DECAY AMPLITUDES AT THE POLE

$\Delta(1940) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

<u>MODULUS ($\text{GeV}^{-1/2}$)</u>	<u>PHASE ($^\circ$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.170 ^{+0.120} _{-0.100}	-10 ± 30	SOKHOYAN	15A	DPWA Multichannel

$\Delta(1940) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

<u>MODULUS ($\text{GeV}^{-1/2}$)</u>	<u>PHASE ($^\circ$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.150±0.080	-10 ± 30	SOKHOYAN	15A	DPWA Multichannel

$\Delta(1940)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

$\Delta(1940) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

<u>VALUE ($\text{GeV}^{-1/2}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.1614±0.0031	¹ HUNT	19	DPWA Multichannel
0.170 ^{+0.110} _{-0.080}	SOKHOYAN	15A	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.170 ^{+0.110} _{-0.080}	GUTZ	14	DPWA Multichannel

¹Statistical error only.

$\Delta(1940) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

<u>VALUE (GeV^{-1/2})</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-0.209±0.023	¹ HUNT	19	DPWA Multichannel
0.150±0.080	SOKHOYAN	15A	DPWA Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.150±0.080	GUTZ	14	DPWA Multichannel
¹ Statistical error only.			

$\Delta(1940)$ REFERENCES

HUNT	19	PR C99 055205	B.C. Hunt, D.M. Manley	
SOKHOYAN	15A	EPJ A51 95	V. Sokhoyan <i>et al.</i>	(CBELSA/TAPS Collab.)
GUTZ	14	EPJ A50 74	E. Gutz <i>et al.</i>	(CBELSA/TAPS Collab.)
SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	(RBI Zagreb, UNI Tuzla)
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)
HORN	08A	EPJ A38 173	I. Horn <i>et al.</i>	(CB-ELSA Collab.)
Also		PRL 101 202002	I. Horn <i>et al.</i>	(CB-ELSA Collab.)
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)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT)