

**$\Delta(1940) D_{33}$**

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

OMITTED FROM SUMMARY TABLE

**$\Delta(1940)$  BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>\approx 1940</math> OUR ESTIMATE</b>			
2057 $\pm 110$	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$
2058.1 $\pm 34.5$	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$
1940 $\pm 100$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

**$\Delta(1940)$  BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
460 $\pm 320$	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$
198.4 $\pm 45.5$	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$
200 $\pm 100$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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

**REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1900 $\pm 100$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
1915 or 1926	<sup>1</sup> LONGACRE	78	IPWA $\pi N \rightarrow N\pi\pi$

**-2xIMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
200 $\pm 60$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
190 or 186	<sup>1</sup> LONGACRE	78	IPWA $\pi N \rightarrow N\pi\pi$

**$\Delta(1940)$  ELASTIC POLE RESIDUE**

**MODULUS  $|r|$**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8 $\pm 3$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

**PHASE  $\theta$**

<u>VALUE (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
135 $\pm 45$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

## $\Delta(1940)$ DECAY MODES

Mode
$\Gamma_1$ $N\pi$
$\Gamma_2$ $\Sigma K$
$\Gamma_3$ $N\pi\pi$
$\Gamma_4$ $\Delta(1232)\pi$ , S-wave
$\Gamma_5$ $\Delta(1232)\pi$ , D-wave
$\Gamma_6$ $N\rho$ , S=3/2, S-wave
$\Gamma_7$ $N\gamma$ , helicity=1/2
$\Gamma_8$ $N\gamma$ , helicity=3/2

## $\Delta(1940)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.18±0.12	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$
0.18	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$
0.05±0.02	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\pi \rightarrow \Delta(1940) \rightarrow \Sigma K$   $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.015	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\pi \rightarrow \Delta(1940) \rightarrow \Delta(1232)\pi$ , S-wave  $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.11±0.10	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\pi \rightarrow \Delta(1940) \rightarrow \Delta(1232)\pi$ , D-wave  $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.27±0.16	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\pi \rightarrow \Delta(1940) \rightarrow N\rho$ , S=3/2, S-wave  $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.25±0.10	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

## $\Delta(1940)$ PHOTON DECAY AMPLITUDES

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

<u>VALUE (GeV<sup>-1/2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-0.036±0.058	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$

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

<u>VALUE (GeV<sup>-1/2</sup>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-0.031±0.012	AWAJI	81	DPWA $\gamma N \rightarrow \pi N$

## $\Delta(1940)$ FOOTNOTES

<sup>1</sup> 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.

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## $\Delta(1940)$ REFERENCES

MANLEY	92	PR D45 4002	D.M. Manley, E.M. Saleski	(KENT) IJP
Also	84	PR D30 904	D.M. Manley <i>et al.</i>	(VPI)
CANDLIN	84	NP B238 477	D.J. Candlin <i>et al.</i>	(EDIN, RAL, LOWC)
AWAJI	81	Bonn Conf. 352	N. Awaji, R. Kajikawa	(NAGO)
Also	82	NP B197 365	K. Fujii <i>et al.</i>	(NAGO)
CHEW	80	Toronto Conf. 123	D.M. Chew	(LBL) IJP
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
Also	79	PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL)
LONGACRE	78	PR D17 1795	R.S. Longacre <i>et al.</i>	(LBL, SLAC)

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