

$\Delta(2000) F_{35}$

$I(J^P) = \frac{3}{2}(\frac{5}{2}^+)$  Status: \*\*

OMITTED FROM SUMMARY TABLE

$\Delta(2000)$  BREIT-WIGNER MASS

| VALUE (MeV)                                   | DOCUMENT ID | TECN | COMMENT                                      |
|-----------------------------------------------|-------------|------|----------------------------------------------|
| <b><math>\approx 2000</math> OUR ESTIMATE</b> |             |      |                                              |
| $1752 \pm 32$                                 | MANLEY      | 92   | IPWA $\pi N \rightarrow \pi N$ & $N \pi \pi$ |
| $2200 \pm 125$                                | CUTKOSKY    | 80   | IPWA $\pi N \rightarrow \pi N$               |

$\Delta(2000)$  BREIT-WIGNER WIDTH

| VALUE (MeV)   | DOCUMENT ID | TECN | COMMENT                                      |
|---------------|-------------|------|----------------------------------------------|
| $251 \pm 93$  | MANLEY      | 92   | IPWA $\pi N \rightarrow \pi N$ & $N \pi \pi$ |
| $400 \pm 125$ | CUTKOSKY    | 80   | IPWA $\pi N \rightarrow \pi N$               |

$\Delta(2000)$  POLE POSITION

REAL PART

| VALUE (MeV)    | DOCUMENT ID | TECN | COMMENT                        |
|----------------|-------------|------|--------------------------------|
| $2150 \pm 100$ | CUTKOSKY    | 80   | IPWA $\pi N \rightarrow \pi N$ |

−2×IMAGINARY PART

| VALUE (MeV)   | DOCUMENT ID | TECN | COMMENT                        |
|---------------|-------------|------|--------------------------------|
| $350 \pm 100$ | CUTKOSKY    | 80   | IPWA $\pi N \rightarrow \pi N$ |

$\Delta(2000)$  ELASTIC POLE RESIDUE

MODULUS  $|r|$

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT                        |
|-------------|-------------|------|--------------------------------|
| $16 \pm 5$  | CUTKOSKY    | 80   | IPWA $\pi N \rightarrow \pi N$ |

PHASE  $\theta$

| VALUE (°)    | DOCUMENT ID | TECN | COMMENT                        |
|--------------|-------------|------|--------------------------------|
| $150 \pm 90$ | CUTKOSKY    | 80   | IPWA $\pi N \rightarrow \pi N$ |

$\Delta(2000)$  DECAY MODES

| Mode                                      |
|-------------------------------------------|
| $\Gamma_1$ $N \pi$                        |
| $\Gamma_2$ $N \pi \pi$                    |
| $\Gamma_3$ $\Delta(1232) \pi$ , $P$ -wave |
| $\Gamma_4$ $\Delta(1232) \pi$ , $F$ -wave |
| $\Gamma_5$ $N \rho$ , $S=3/2$ , $P$ -wave |

**$\Delta(2000)$  BRANCHING RATIOS**

| $\Gamma(N\pi)/\Gamma_{\text{total}}$                                                                                            |             |      |         |                                               | $\Gamma_1/\Gamma$                 |
|---------------------------------------------------------------------------------------------------------------------------------|-------------|------|---------|-----------------------------------------------|-----------------------------------|
| VALUE                                                                                                                           | DOCUMENT ID | TECN | COMMENT |                                               |                                   |
| $0.02 \pm 0.01$                                                                                                                 | MANLEY      | 92   | IPWA    | $\pi N \rightarrow \pi N \text{ \& } N\pi\pi$ |                                   |
| $0.07 \pm 0.04$                                                                                                                 | CUTKOSKY    | 80   | IPWA    | $\pi N \rightarrow \pi N$                     |                                   |
|                                                                                                                                 |             |      |         |                                               |                                   |
| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow \Delta(2000) \rightarrow \Delta(1232)\pi$ , <i>P-wave</i> |             |      |         |                                               | $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$ |
| VALUE                                                                                                                           | DOCUMENT ID | TECN | COMMENT |                                               |                                   |
| $+0.07 \pm 0.03$                                                                                                                | MANLEY      | 92   | IPWA    | $\pi N \rightarrow \pi N \text{ \& } N\pi\pi$ |                                   |
|                                                                                                                                 |             |      |         |                                               |                                   |
| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow \Delta(2000) \rightarrow \Delta(1232)\pi$ , <i>F-wave</i> |             |      |         |                                               | $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$ |
| VALUE                                                                                                                           | DOCUMENT ID | TECN | COMMENT |                                               |                                   |
| $+0.09 \pm 0.04$                                                                                                                | MANLEY      | 92   | IPWA    | $\pi N \rightarrow \pi N \text{ \& } N\pi\pi$ |                                   |
|                                                                                                                                 |             |      |         |                                               |                                   |
| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow \Delta(2000) \rightarrow N\rho$ , <i>S=3/2, P-wave</i>    |             |      |         |                                               | $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$ |
| VALUE                                                                                                                           | DOCUMENT ID | TECN | COMMENT |                                               |                                   |
| $-0.06 \pm 0.01$                                                                                                                | MANLEY      | 92   | IPWA    | $\pi N \rightarrow \pi N \text{ \& } N\pi\pi$ |                                   |

**$\Delta(2000)$  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)      |
| CUTKOSKY | 80 | Toronto Conf. 19 | R.E. Cutkosky <i>et al.</i> | (CMU, LBL) |
| Also     | 79 | PR D20 2839      | R.E. Cutkosky <i>et al.</i> | (CMU, LBL) |