

$\Delta(2200) 7/2^-$ $I(J^P) = \frac{3}{2}(\frac{7}{2}^-)$ Status: *** **$\Delta(2200)$ POLE POSITION****REAL PART**

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|--------------|------|---------------------------|
| 2050 to 2150 (\approx 2100) OUR ESTIMATE | | | |
| 2100 \pm 50 | CUTKOSKY 80 | IPWA | $\pi N \rightarrow \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 2142 | ROENCHEN 15A | DPWA | Multichannel |

–2×IMAGINARY PART

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|--------------|------|---------------------------|
| 260 to 420 (\approx 340) OUR ESTIMATE | | | |
| 340 \pm 80 | CUTKOSKY 80 | IPWA | $\pi N \rightarrow \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 486 | ROENCHEN 15A | DPWA | Multichannel |

 $\Delta(2200)$ ELASTIC POLE RESIDUE**MODULUS $|r|$**

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|--------------|------|---------------------------|
| 8 \pm 3 | CUTKOSKY 80 | IPWA | $\pi N \rightarrow \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 17 | ROENCHEN 15A | DPWA | Multichannel |

PHASE θ

| VALUE ($^\circ$) | DOCUMENT ID | TECN | COMMENT |
|---|--------------|------|---------------------------|
| –70 \pm 40 | CUTKOSKY 80 | IPWA | $\pi N \rightarrow \pi N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| –56 | ROENCHEN 15A | DPWA | Multichannel |

 $\Delta(2200)$ INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \rightarrow \Delta(2200) \rightarrow \Sigma K$

| MODULUS | PHASE ($^\circ$) | DOCUMENT ID | TECN | COMMENT |
|---|--------------------|--------------|------|--------------|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.005 | –103 | ROENCHEN 15A | DPWA | Multichannel |

Normalized residue in $N\pi \rightarrow \Delta(2200) \rightarrow \Delta\pi, D$ -wave

| MODULUS | PHASE ($^\circ$) | DOCUMENT ID | TECN | COMMENT |
|---|--------------------|--------------|------|--------------|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.23 | 107 | ROENCHEN 15A | DPWA | Multichannel |

Normalized residue in $N\pi \rightarrow \Delta(2200) \rightarrow \Delta\pi$, G-wave

| <u>MODULUS</u> | <u>PHASE ($^\circ$)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|----------------|---|--------------------|-------------|----------------|
| • • • | We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 0.022 | -151 | ROENCHEN | 15A DPWA | Multichannel |

 $\Delta(2200)$ BREIT-WIGNER MASS

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--|--------------------|-------------|---------------------------|
| 2150 to 2250 (≈ 2200) OUR ESTIMATE | | | |
| 2176 \pm 40 | ANISOVICH | 17 DPWA | Multichannel |
| 2200 \pm 80 | CUTKOSKY | 80 IPWA | $\pi N \rightarrow \pi N$ |
| 2215 \pm 60 | HOEHLER | 79 IPWA | $\pi N \rightarrow \pi N$ |

 $\Delta(2200)$ BREIT-WIGNER WIDTH

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|---------------------------|
| 200 to 500 (≈ 350) OUR ESTIMATE | | | |
| 210 \pm 70 | ANISOVICH | 17 DPWA | Multichannel |
| 450 \pm 100 | CUTKOSKY | 80 IPWA | $\pi N \rightarrow \pi N$ |
| 400 \pm 100 | HOEHLER | 79 IPWA | $\pi N \rightarrow \pi N$ |

 $\Delta(2200)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|----------------------------------|--------------------------------|
| Γ_1 $N\pi$ | 2–8 % |
| Γ_2 ΣK | 1–7 % |
| Γ_3 $N\pi\pi$ | >45 % |
| Γ_4 $\Delta\pi$ | >45 % |
| Γ_5 $\Delta\pi$, D-wave | >40 % |
| Γ_6 $\Delta\pi$, G-wave | 5–25 % |
| Γ_7 $\Delta\eta$ | |
| Γ_8 $\Delta\eta$, D-wave | seen |

 $\Delta(2200)$ BRANCHING RATIOS

| $\Gamma(N\pi)/\Gamma_{\text{total}}$ | Γ_1/Γ | | |
|--|--------------------|-------------|---------------------------|
| <u>VALUE (%)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
| 2–8 % OUR ESTIMATE | | | |
| 3.5 \pm 1.5 | ANISOVICH | 17 DPWA | Multichannel |
| 6 \pm 2 | CUTKOSKY | 80 IPWA | $\pi N \rightarrow \pi N$ |
| 5 \pm 2 | HOEHLER | 79 IPWA | $\pi N \rightarrow \pi N$ |
| $\Gamma(\Sigma K)/\Gamma_{\text{total}}$ | Γ_2/Γ | | |
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
| 0.04 \pm 0.03 | ANISOVICH | 17 DPWA | Multichannel |

| $\Gamma(\Delta\pi, D\text{-wave})/\Gamma_{\text{total}}$ | | | | Γ_5/Γ |
|---|--------------------|-------------|----------------|-------------------|
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| >40 % OUR ESTIMATE | | | | |
| 0.70 ± 0.30 | ANISOVICH 17 | DPWA | Multichannel | |
| $\Gamma(\Delta\pi, G\text{-wave})/\Gamma_{\text{total}}$ | | | | Γ_6/Γ |
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| 0.15 ± 0.10 | ANISOVICH 17 | DPWA | Multichannel | |
| $\Gamma(\Delta\eta, D\text{-wave})/\Gamma_{\text{total}}$ | | | | Γ_8/Γ |
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| ~ 0.01 | ANISOVICH 17 | DPWA | Multichannel | |

$\Delta(2200)$ PHOTON DECAY AMPLITUDES AT THE POLE

$\Delta(2200) \rightarrow N\gamma$, 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> |
|---|------------------------------------|--------------------|-------------|----------------|
| $0.107^{+0.011}_{-0.020}$ | -36 ± 5 | ROENCHEN 14 | DPWA | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.106 | -23 | ROENCHEN 15A | DPWA | Multichannel |

$\Delta(2200) \rightarrow N\gamma$, 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> |
|---|------------------------------------|--------------------|-------------|----------------|
| $-0.131^{+0.024}_{-0.009}$ | 113^{+9}_{-5} | ROENCHEN 14 | DPWA | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 0.157 | -60 | ROENCHEN 15A | DPWA | Multichannel |

$\Delta(2200)$ REFERENCES

| | | | |
|--------------|---------------------|------------------------------|----------------|
| ANISOVICH 17 | PL B766 357 | A.V. Anisovich <i>et al.</i> | |
| ROENCHEN 15A | EPJ A51 70 | D. Roenchen <i>et al.</i> | |
| ROENCHEN 14 | EPJ A50 101 | D. Roenchen <i>et al.</i> | |
| Also | EPJ A51 63 (errat.) | D. Roenchen <i>et al.</i> | |
| 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 |