

$\Delta(2200) 7/2^-$ $I(J^P) = \frac{3}{2}(\frac{7}{2}^-)$ 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>
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				
0.15 ± 0.10	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