NODE=B135

$\Delta(2200)$ $7/2^-$

$I(J^P) = \frac{3}{2}(\frac{7}{2}^-)$ Status: ∗∗∗

$\Delta(2200)$ POLE POSITION

NODE=B135215

REAL PART

NODE=B135RE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2050 to 2150 (≈ 2100) OUR ESTIMATE				
2090±20	SARANTSEV	25	DPWA	Multichannel
1963± 1	ROENCHEN	22	DPWA	Multichannel
2100±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

→ UNCHECKED ←

−2×IMAGINARY PART

NODE=B135IM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
260 to 420 (≈ 340) OUR ESTIMATE				
360±35	SARANTSEV	25	DPWA	Multichannel
328± 2	ROENCHEN	22	DPWA	Multichannel
340±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

→ UNCHECKED ←

$\Delta(2200)$ ELASTIC POLE RESIDUE

NODE=B135220

MODULUS $|r|$

NODE=B135RER

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
6.8±0.3	ROENCHEN	22	DPWA	Multichannel
8 ±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

NODE=B135IMR

VALUE (°)	DOCUMENT ID		TECN	COMMENT
−80± 1	ROENCHEN	22	DPWA	Multichannel
−70±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

NODE=B135240

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

NODE=B135240

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

NODE=B135A00

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.001±0.002	−123 ± 1	ROENCHEN	22	DPWA	Multichannel
• • • 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

NODE=B135A01

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.16±0.01	100 ± 1	ROENCHEN	22	DPWA	Multichannel
• • • 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

NODE=B135A02

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.003±0.001	152 ± 3	ROENCHEN	22	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.022	−151	ROENCHEN	15A	DPWA	Multichannel

$\Delta(2200)$ BREIT-WIGNER MASS

NODE=B135M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2150 to 2250 (≈ 2200) OUR ESTIMATE				
2180±30	SARANTSEV	25	DPWA	Multichannel
2200±80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
2215±60	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2176±40	ANISOVICH	17	DPWA	Multichannel

NODE=B135M
→ UNCHECKED ←

Δ(2200) BREIT-WIGNER WIDTH

NODE=B135W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
200 to 500 (≈ 350) OUR ESTIMATE				
420± 50	SARANTSEV	25	DPWA	Multichannel
450±100	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
400±100	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
210± 70	ANISOVICH	17	DPWA	Multichannel

NODE=B135W
→ UNCHECKED ←
OCCUR=2

Δ(2200) DECAY MODES

NODE=B135225;NODE=B135

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\pi$	2–8 %	DESIG=1
Γ_2	ΣK	1–7 %	DESIG=3;OUR EST
Γ_3	$N\pi\pi$	>45 %	DESIG=7;OUR EST
Γ_4	$\Delta\pi$	>45 %	DESIG=8;OUR EST
Γ_5	$\Delta\pi$, D-wave	(70±30) %	DESIG=4
Γ_6	$\Delta\pi$, G-wave	5–25 %	DESIG=5;OUR EST
Γ_7	$\Delta\eta$		DESIG=9
Γ_8	$\Delta\eta$, D-wave	seen	DESIG=6;OUR EST

Δ(2200) BRANCHING RATIOS

NODE=B135230

$\Gamma(N\pi)/\Gamma_{total}$ — Γ_1/Γ

NODE=B135R1
NODE=B135R1
→ UNCHECKED ←

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2–8 % OUR ESTIMATE				
3.5±1.5	ANISOVICH	17	DPWA	Multichannel
6 ±2	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
5 ±2	HOEHLER	79	IPWA	$\pi N \to \pi N$

$\Gamma(\Sigma K)/\Gamma_{total}$ — Γ_2/Γ

NODE=B135R00
NODE=B135R00

VALUE (%)	DOCUMENT ID		TECN	COMMENT
4±3	ANISOVICH	17	DPWA	Multichannel

$\Gamma(\Delta\pi)/\Gamma_{total}$ — Γ_4/Γ

NODE=B135R04
NODE=B135R04

VALUE (%)	DOCUMENT ID		TECN	COMMENT
2±2	SARANTSEV	25	DPWA	Multichannel

$\Gamma(\Delta\pi, D\text{-wave})/\Gamma_{total}$ — Γ_5/Γ

NODE=B135R01
NODE=B135R01

VALUE (%)	DOCUMENT ID		TECN	COMMENT
70±30	ANISOVICH	17	DPWA	Multichannel

$\Gamma(\Delta\pi, G\text{-wave})/\Gamma_{total}$ — Γ_6/Γ

NODE=B135R02
NODE=B135R02

VALUE (%)	DOCUMENT ID		TECN	COMMENT
1± 1	SARANTSEV	25	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
15±10	ANISOVICH	17	DPWA	Multichannel

$\Gamma(\Delta\eta, D\text{-wave})/\Gamma_{total}$ — Γ_8/Γ

NODE=B135R03
NODE=B135R03

VALUE (%)	DOCUMENT ID		TECN	COMMENT
~ 1	ANISOVICH	17	DPWA	Multichannel

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

NODE=B135260

$\Delta(2200) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B135PA1
NODE=B135PA1

MODULUS ($GeV^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.120±0.015	−35 ± 20	SARANTSEV	25	DPWA	Multichannel
0.104±0.011	−139 ± 2	ROENCHEN	22	DPWA	Multichannel
• • • 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 $A_{3/2}$

NODE=B135PA2
NODE=B135PA2

MODULUS ($GeV^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.073±0.012	−30 ± 20	SARANTSEV	25	DPWA	Multichannel
0.021±0.013	−180 ± 20	ROENCHEN	22	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.157	−60	ROENCHEN	15A	DPWA	Multichannel

$\Delta(2200)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

NODE=B135250

$\Delta(2200) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B135A1
NODE=B135A1

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.125±0.016	SARANTSEV	25	DPWA	Multichannel

$\Delta(2200) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B135A2
NODE=B135A2

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.075±0.012	SARANTSEV	25	DPWA	Multichannel

$\Delta(2200)$ REFERENCES

NODE=B135

SARANTSEV	25	PR C112 015202	A.V. Sarantsev *et al.*	(Bonn-Gatchina Collab.)	REFID=63294
ROENCHEN	22	EPJ A58 229	D. Roenchen *et al.*	(JULI, GWU, BONN+)	REFID=61999
ANISOVICH	17	PL B766 357	A.V. Anisovich *et al.*		REFID=57882
ROENCHEN	15A	EPJ A51 70	D. Roenchen *et al.*		REFID=58183
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky *et al.*	(CMU, LBL) IJP	REFID=30064
Also		PR D20 2839	R.E. Cutkosky *et al.*	(CMU, LBL) IJP	REFID=40096
HOEHLER	79	PDAT 12-1	G. Hohler *et al.*	(KARLT) IJP	REFID=30058
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP	REFID=30859