

$\Delta(2400) \ 9/2^-$

$I(J^P) = \frac{3}{2}(\frac{9}{2}^-)$ Status: **

OMITTED FROM SUMMARY TABLE

$\Delta(2400)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2458± 2	ROENCHEN 22	DPWA	Multichannel
2260±60	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1931	ROENCHEN 15A	DPWA	Multichannel
1983	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
280± 2	ROENCHEN 22	DPWA	Multichannel
320±160	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
442	ROENCHEN 15A	DPWA	Multichannel
878	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$

$\Delta(2400)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
5.4±2.7	ROENCHEN 22	DPWA	Multichannel
8 ±4	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
13	ROENCHEN 15A	DPWA	Multichannel
24	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$

PHASE θ

VALUE (°)	DOCUMENT ID	TECN	COMMENT
8.4±17	ROENCHEN 22	DPWA	Multichannel
− 25 ±15	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
− 96	ROENCHEN 15A	DPWA	Multichannel
− 139	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$

$\Delta(2400)$ INELASTIC POLE RESIDUE

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

Normalized residue in $N\pi \rightarrow \Delta(2400) \rightarrow \Sigma K$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.004±0.003	17 ± 15	ROENCHEN 22	DPWA	Multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.009	25	ROENCHEN 15A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow \Delta(2400) \rightarrow \Delta\pi$, G-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.10 ± 0.05	17 ± 11	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.18	−110	ROENCHEN	15A	DPWA Multichannel

Normalized residue in $N\pi \rightarrow \Delta(2400) \rightarrow \Delta\pi$, I-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.019 ± 0.003	-120 ± 25	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.012	−1.0	ROENCHEN	15A	DPWA Multichannel

$\Delta(2400)$ BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2643 ± 141	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2300 ± 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2468 ± 50	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$

¹Statistical error only.

$\Delta(2400)$ BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
895 ± 432	² ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
330 ± 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
480 ± 100	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$

²Statistical error only.

$\Delta(2400)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	3–9 %

$\Delta(2400)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	Γ_1/Γ
6.4 ± 2.2	³ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	
5 ± 2	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$	
6 ± 3	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	

³Statistical error only.

$\Delta(2400)$ PHOTON DECAY AMPLITUDES AT THE POLE

$\Delta(2400) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

<i>MODULUS</i> ($\text{GeV}^{-1/2}$)	<i>PHASE</i> ($^\circ$)	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.021 ± 0.007	-67 ± 12	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.034	63	ROENCHEN	15A	DPWA Multichannel

$\Delta(2400) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

<i>MODULUS</i> ($\text{GeV}^{-1/2}$)	<i>PHASE</i> ($^\circ$)	<i>DOCUMENT ID</i>	<i>TECN</i>	<i>COMMENT</i>
0.022 ± 0.007	122 ± 7	ROENCHEN	22	DPWA Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.054	-75	ROENCHEN	15A	DPWA Multichannel

$\Delta(2400)$ REFERENCES

ROENCHEN	22	EPJ A58 229	D. Roenchen <i>et al.</i>	(JULI, GWU, BONN+)
ROENCHEN	15A	EPJ A51 70	D. Roenchen <i>et al.</i>	
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
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)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP