

$$\Delta(2420) \ 11/2^+$$

$$I(J^P) = \frac{3}{2}(\frac{11}{2}^+) \text{ Status: } ****$$

Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014).

$\Delta(2420)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2300 to 2500 (\approx 2400) OUR ESTIMATE			
2454 \pm 4 \pm 11	¹ SVARC 14	L+P	$\pi N \rightarrow \pi N$
2360 \pm 100	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2529	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$
2300	HOEHLER 93	ARGD	$\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

– 2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
350 to 550 (\approx 450) OUR ESTIMATE			
462 \pm 8 \pm 50	¹ SVARC 14	L+P	$\pi N \rightarrow \pi N$
420 \pm 100	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
621	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$
620	HOEHLER 93	ARGD	$\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

$\Delta(2420)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
20 to 40 (\approx 30) OUR ESTIMATE			
30 \pm 1 \pm 7	¹ SVARC 14	L+P	$\pi N \rightarrow \pi N$
18 \pm 6	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
33	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$
39	HOEHLER 93	ARGD	$\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

PHASE θ

VALUE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
– 60 to 20 (\approx – 20) OUR ESTIMATE			
11 \pm 1 \pm 8	¹ SVARC 14	L+P	$\pi N \rightarrow \pi N$
– 30 \pm 40	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
– 45	ARNDT 06	DPWA	$\pi N \rightarrow \pi N, \eta N$
– 60	HOEHLER 93	ARGD	$\pi N \rightarrow \pi N$

¹Fit to the amplitudes of HOEHLER 79.

$\Delta(2420)$ BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2300 to 2600 (≈ 2450) OUR ESTIMATE			
2633 ± 29	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2400 ± 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2416 ± 17	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$

¹Statistical error only. **$\Delta(2420)$ BREIT-WIGNER WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
300 to 700 (≈ 500) OUR ESTIMATE			
692 ± 47	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
450 ± 150	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
340 ± 28	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$

¹Statistical error only. **$\Delta(2420)$ DECAY MODES**

The following branching fractions are our estimates, not fits or averages.

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\pi$	5–10 %

 $\Delta(2420)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$					Γ_1/Γ
VALUE (%)	DOCUMENT ID	TECN	COMMENT		
5 to 10 (≈ 8) OUR ESTIMATE					
8.5 ± 0.8	¹ ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$		
8 ± 3	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$		
8.0 ± 1.5	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$		

¹Statistical error only. **$\Delta(2420)$ REFERENCES**

PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	(RBI Zagreb, UNI Tuzla)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)
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