

$\Delta(2420) H_{3,11}$

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

Most of the results published before 1975 are now obsolete and have been omitted. They may be found in our 1982 edition, Physics Letters **111B** 1 (1982).

$\Delta(2420)$ BREIT-WIGNER MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2300 to 2500 (≈ 2420) OUR ESTIMATE			
2633 \pm 29	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2400 \pm 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2416 \pm 17	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
2400 \pm 60	HENDRY	78	MPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2400	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$
2358.0 \pm 9.0	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$

$\Delta(2420)$ BREIT-WIGNER WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
300 to 500 (≈ 400) OUR ESTIMATE			
692 \pm 47	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
450 \pm 150	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
340 \pm 28	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
460 \pm 100	HENDRY	78	MPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
400	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$
202.2 \pm 45.0	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$

$\Delta(2420)$ POLE POSITION

REAL PART

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2260 to 2400 (≈ 2330) OUR ESTIMATE			
2529	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2300	¹ HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
2360 \pm 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

– 2×IMAGINARY PART

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
350 to 750 (≈ 550) OUR ESTIMATE			
621	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
620	¹ HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
420 \pm 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

$\Delta(2420)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
33	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
39	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
18 ± 6	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

PHASE θ

<u>VALUE ($^\circ$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-45	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
-60	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
-30 ± 40	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

$\Delta(2420)$ DECAY MODES

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

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad N\pi$	5-15 %
$\Gamma_2 \quad \Sigma K$	

$\Delta(2420)$ BRANCHING RATIOS

<u>$\Gamma(N\pi)/\Gamma_{\text{total}}$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>Γ_1/Γ</u>
0.05 to 0.15 OUR ESTIMATE				
0.085 ± 0.008	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	
0.08 ± 0.03	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$	
0.08 ± 0.015	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
0.11 ± 0.02	HENDRY	78	MPWA $\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.22	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$	

<u>$(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow \Delta(2420) \rightarrow \Sigma K$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u>$(\Gamma_1 \Gamma_2)^{1/2}/\Gamma$</u>
-0.016	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$	

$\Delta(2420)$ FOOTNOTES

¹ See HOEHLER 93 for a detailed discussion of the evidence for and the pole parameters of N and Δ resonances as determined from Argand diagrams of πN elastic partial-wave amplitudes and from plots of the speeds with which the amplitudes traverse the diagrams.

$\Delta(2420)$ REFERENCES

ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
HOEHLER	93	πN Newsletter 9 1	G. Hohler	(KARL)
CANDLIN	84	NP B238 477	D.J. Candlin <i>et al.</i>	(EDIN, RAL, LOWC)
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, CIT, CERN)
CHEW	80	Toronto Conf. 123	D.M. Chew	(LBL) IJP
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
HENDRY	78	PRL 41 222	A.W. Hendry	(IND, LBL) IJP
Also		ANP 136 1	A.W. Hendry	(IND)
