

Δ(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** (1982).

Δ(2420) BREIT-WIGNER MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2300 to 2500 (≈ 2420) OUR ESTIMATE			
2400 ± 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2416 ± 17	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
2400 ± 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 ± 9.0	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$

Δ(2420) BREIT-WIGNER WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
300 to 500 (≈ 400) OUR ESTIMATE			
450 ± 150	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
340 ± 28	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
460 ± 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 ± 45.0	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$

Δ(2420) POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2260 to 2400 (≈ 2330) OUR ESTIMATE			
2300	¹ HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
2360 ± 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

− 2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
350 to 750 (≈ 550) OUR ESTIMATE			
620	¹ HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
420 ± 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

Δ(2420) ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
39	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
18 ± 6	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

PHASE θ

VALUE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
-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_j/Γ)
Γ_1 $N\pi$	5-15 %
Γ_2 ΣK	

$\Delta(2420)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	Γ_1/Γ
0.05 to 0.15 OUR ESTIMATE				
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 $\pi^+ p \rightarrow \pi^+ p$	

$(\Gamma_j \Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow \Delta(2420) \rightarrow \Sigma K$	DOCUMENT ID	TECN	COMMENT	$(\Gamma_1 \Gamma_2)^{1/2}/\Gamma$
-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

HOEHLER	93	πN Newsletter 9 1		(KARL)
CANDLIN	84	NP B238 477	+Lowe, Peach, Scotland+	(EDIN, RAL, LOWC)
PDG	82	PL 111B	Roos, Porter, Aguilar-Benitez+	(HELS, CIT, CERN)
CHEW	80	Toronto Conf. 123		(LBL) IJP
CUTKOSKY	80	Toronto Conf. 19	+Forsyth, Babcock, Kelly, Hendrick	(CMU, LBL) IJP
Also	79	PR D20 2839	Cutkosky, Forsyth, Hendrick, Kelly	(CMU, LBL)
HOEHLER	79	PDAT 12-1	+Kaiser, Koch, Pietarinen	(KARLT) IJP
Also	80	Toronto Conf. 3	Koch	(KARLT) IJP
HENDRY	78	PRL 41 222		(IND, LBL) IJP
Also	81	ANP 136 1	Hendry	(IND)