

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

$$I(J^P) = \frac{3}{2}(\frac{11}{2}^+)$$
 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>
<b>2300 to 2500 (<math>\approx 2420</math>) OUR ESTIMATE</b>			
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>
<b>300 to 500 (<math>\approx 400</math>) OUR ESTIMATE</b>			
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>
<b>2260 to 2400 (<math>\approx 2330</math>) OUR ESTIMATE</b>			
2529	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2300	<sup>1</sup> 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>
<b>350 to 750 (<math>\approx 550</math>) OUR ESTIMATE</b>			
621	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
620	<sup>1</sup> 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 $\pi N \rightarrow \pi N$
$18 \pm 6$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

### PHASE $\theta$

<u>VALUE (<math>^\circ</math>)</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 $\pi N \rightarrow \pi N$
$-30 \pm 40$	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 ( $\Gamma_i/\Gamma$ )
$\Gamma_1 \quad N\pi$	5-15 %
$\Gamma_2 \quad \Sigma K$	

## $\Delta(2420)$ BRANCHING RATIOS

<u><math>\Gamma(N\pi)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>\Gamma_1/\Gamma</math></u>
<b>0.05 to 0.15 OUR ESTIMATE</b>				
$0.085 \pm 0.008$	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	
$0.08 \pm 0.03$	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$	
$0.08 \pm 0.015$	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
$0.11 \pm 0.02$	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><math>(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow \Delta(2420) \rightarrow \Sigma K</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	<u><math>(\Gamma_1 \Gamma_2)^{1/2}/\Gamma</math></u>
-0.016	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$	

## $\Delta(2420)$ FOOTNOTES

<sup>1</sup> See HOEHLER 93 for a detailed discussion of the evidence for and the pole parameters of  $N$  and  $\Delta$  resonances as determined from Argand diagrams of  $\pi N$  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	$\pi N$ 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)

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