

$\Delta(2000) 5/2^+$  $I(J^P) = \frac{3}{2}(\frac{5}{2}^+)$  Status: \*\*

OMITTED FROM SUMMARY TABLE

The latest GWU analysis (ARNDT 06) finds no evidence for this resonance.

 **$\Delta(2000)$  BREIT-WIGNER MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>\approx 2000</math> OUR ESTIMATE</b>			
1724 $\pm$ 61	VRANA	00	DPWA Multichannel
2200 $\pm$ 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2015 $\pm$ 24	SHRESTHA	12A	DPWA Multichannel
1752 $\pm$ 32	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

 **$\Delta(2000)$  BREIT-WIGNER WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
138 $\pm$ 68	VRANA	00	DPWA Multichannel
400 $\pm$ 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
500 $\pm$ 52	SHRESTHA	12A	DPWA Multichannel
251 $\pm$ 93	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

 **$\Delta(2000)$  POLE POSITION****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1697	VRANA	00	DPWA Multichannel
2150 $\pm$ 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1976	SHRESTHA	12A	DPWA Multichannel

 **$-2 \times$ IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
112	VRANA	00	DPWA Multichannel
350 $\pm$ 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
488	SHRESTHA	12A	DPWA Multichannel

 **$\Delta(2000)$  ELASTIC POLE RESIDUE****MODULUS  $|r|$** 

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
16 $\pm$ 5	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

## PHASE $\theta$

<u>VALUE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
150±90	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$

## $\Delta(2000)$ DECAY MODES

Mode
$\Gamma_1$ $N\pi$
$\Gamma_2$ $N\pi\pi$
$\Gamma_3$ $\Delta(1232)\pi$ , <i>P</i> -wave
$\Gamma_4$ $\Delta(1232)\pi$ , <i>F</i> -wave
$\Gamma_5$ $N\rho$ , $S=3/2$ , <i>P</i> -wave
$\Gamma_6$ $p\gamma$
$\Gamma_7$ $p\gamma$ , helicity=1/2
$\Gamma_8$ $p\gamma$ , helicity=3/2

## $\Delta(2000)$ BRANCHING RATIOS

<u><math>\Gamma(N\pi)/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_1/\Gamma$
0±1	VRANA 00	DPWA	Multichannel	
7±4	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7±1	SHRESTHA 12A	DPWA	Multichannel	
2±1	MANLEY 92	IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$	

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow \Delta(2000) \rightarrow \Delta(1232)\pi</math>, <i>P</i>-wave</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_1\Gamma_3)^{1/2}/\Gamma$
+0.07±0.03	MANLEY 92	IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$	

<u><math>\Gamma(\Delta(1232)\pi, \textit{P}\text{-wave})/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_3/\Gamma$
0±1	VRANA 00	DPWA	Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3±3	SHRESTHA 12A	DPWA	Multichannel	

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\pi \rightarrow \Delta(2000) \rightarrow \Delta(1232)\pi</math>, <i>F</i>-wave</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_1\Gamma_4)^{1/2}/\Gamma$
+0.09±0.04	MANLEY 92	IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$	

<u><math>\Gamma(\Delta(1232)\pi, \textit{F}\text{-wave})/\Gamma_{\text{total}}</math></u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_4/\Gamma$
40±1	VRANA 00	DPWA	Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 3	SHRESTHA 12A	DPWA	Multichannel	

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$  in  $N\pi \rightarrow \Delta(2000) \rightarrow N\rho, S=3/2, P\text{-wave}$   $(\Gamma_1 \Gamma_5)^{1/2} / \Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.06 \pm 0.01$	MANLEY	92	IPWA $\pi N \rightarrow \pi N \& N\pi\pi$

$\Gamma(N\rho, S=3/2, P\text{-wave}) / \Gamma_{\text{total}}$   $\Gamma_5 / \Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$60 \pm 60$	VRANA	00	DPWA Multichannel
$90 \pm 3$	SHRESTHA	12A	DPWA Multichannel

### $\Delta(2000)$ PHOTON DECAY AMPLITUDES

$\Delta(2000) \rightarrow \rho\gamma$ , helicity-1/2 amplitude  $A_{1/2}$

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$-0.061 \pm 0.018$	SHRESTHA	12A	DPWA Multichannel

$\Delta(2000) \rightarrow \rho\gamma$ , helicity-3/2 amplitude  $A_{3/2}$

VALUE ( $\text{GeV}^{-1/2}$ )	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.158 \pm 0.032$	SHRESTHA	12A	DPWA Multichannel

### $\Delta(2000)$ REFERENCES

SHRESTHA	12A	PR C86 055203	M. Shrestha, D.M. Manley	(KSU)
ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
VRANA	00	PRPL 328 181	T.P. Vrana, S.A. Dytman,, T.-S.H. Lee	(PITT+)
MANLEY	92	PR D45 4002	D.M. Manley, E.M. Saleski	(KSA) IJP
Also		PR D30 904	D.M. Manley <i>et al.</i>	(VPI)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL)
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL)