

$$\Delta(2000) 5/2^+$$

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

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>
≈ 2000 OUR ESTIMATE			
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×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 θ

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

$\Delta(2000)$ DECAY MODES

Mode
Γ_1 $N\pi$
Γ_2 $N\pi\pi$
Γ_3 $\Delta(1232)\pi$, <i>P</i> -wave
Γ_4 $\Delta(1232)\pi$, <i>F</i> -wave
Γ_5 $N\rho$, $S=3/2$, <i>P</i> -wave
Γ_6 $p\gamma$
Γ_7 $p\gamma$, helicity=1/2
Γ_8 $p\gamma$, helicity=3/2

$\Delta(2000)$ BRANCHING RATIOS

<u>$\Gamma(N\pi)/\Gamma_{\text{total}}$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_1/Γ
0 \pm 1	VRANA	00	DPWA Multichannel	
7 \pm 4	CUTKOSKY 80	IPWA	$\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
7 \pm 1	SHRESTHA 12A	DPWA	Multichannel	
2 \pm 1	MANLEY 92	IPWA	$\pi N \rightarrow \pi N$ & $N\pi\pi$	

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

<u>$\Gamma(\Delta(1232)\pi, \textit{P}\text{-wave})/\Gamma_{\text{total}}$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_3/Γ
0 \pm 1	VRANA	00	DPWA Multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3 \pm 3	SHRESTHA 12A	DPWA	Multichannel	

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

<u>$\Gamma(\Delta(1232)\pi, \textit{F}\text{-wave})/\Gamma_{\text{total}}$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_4/Γ
40 \pm 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
-0.06 ± 0.01	MANLEY	92	IPWA $\pi N \rightarrow \pi N \& N\pi\pi$

$\Gamma(N\rho, S=3/2, P\text{-wave}) / \Gamma_{\text{total}}$ Γ_5 / Γ

VALUE (%)	DOCUMENT ID	TECN	COMMENT
60 ± 60	VRANA	00	DPWA Multichannel
90 ± 3	SHRESTHA	12A	DPWA Multichannel

$\Delta(2000)$ PHOTON DECAY AMPLITUDES

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

VALUE ($\text{GeV}^{-1/2}$)	DOCUMENT ID	TECN	COMMENT
-0.061 ± 0.018	SHRESTHA	12A	DPWA Multichannel

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

VALUE ($\text{GeV}^{-1/2}$)	DOCUMENT ID	TECN	COMMENT
0.158 ± 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)