

$\Delta(2000) 5/2^+$ $I(J^P) = \frac{3}{2}(\frac{5}{2}^+)$ 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>
≈ 2000 OUR ESTIMATE			
1724 ± 61	VRANA	00	DPWA Multichannel
2200 ± 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2015 ± 24	SHRESTHA	12A	DPWA Multichannel
1752 ± 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 ± 68	VRANA	00	DPWA Multichannel
400 ± 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
500 ± 52	SHRESTHA	12A	DPWA Multichannel
251 ± 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>
1998 ± 4 ± 4	¹ SVARC	14	MLS $\pi N \rightarrow \pi N$
1697	VRANA	00	DPWA Multichannel
2150 ± 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>
404 ± 10 ± 4	¹ SVARC	14	MLS $\pi N \rightarrow \pi N$
112	VRANA	00	DPWA Multichannel
350 ± 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>
34 ± 1 ± 1	¹ SVARC	14	MLS $\pi N \rightarrow \pi N$
16 ± 5	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

PHASE θ

VALUE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
$110 \pm 1 \pm 3$	¹ SVARC 14	MLS	$\pi N \rightarrow \pi N$
150 ± 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

$\Gamma(N\pi)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	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	$\pi N \rightarrow \pi N$ & $N\pi\pi$	

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

$\Gamma(\Delta(1232)\pi, P\text{-wave})/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	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	

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

$\Gamma(\Delta(1232)\pi, F\text{-wave})/\Gamma_{\text{total}} \qquad \Gamma_4/\Gamma$

VALUE (%)	DOCUMENT ID	TECN	COMMENT
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 $N\pi \rightarrow \Delta(2000) \rightarrow N\rho, S=3/2, P\text{-wave} \qquad (\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
-0.06±0.01	MANLEY	92	IPWA $\pi N \rightarrow \pi N$ & $N\pi\pi$

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

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

$\Delta(2000)$ PHOTON DECAY AMPLITUDES

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

VALUE (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 (GeV ^{-1/2})	DOCUMENT ID	TECN	COMMENT
0.158±0.032	SHRESTHA	12A	DPWA Multichannel

$\Delta(2000)$ FOOTNOTES

¹ Fit to the amplitudes of HOEHLER 79.

$\Delta(2000)$ REFERENCES

SVARC	14	PR C89 045205	A. Svarc <i>et al.</i>	
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)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT)