NODE=B033

$\Delta(1232)\ 3/2^+$

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

NODE=B033

Older and obsolete values are listed and referenced in the 2014 edition, Chinese Physics **C38** 070001 (2014).

Δ(1232) POLE POSITIONS

NODE=B033225

REAL PART, MIXED CHARGES

NODE=B033RE
NODE=B033RE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1209 to 1211 (≈ 1210) OUR ESTIMATE				
1210 ±1	SARANTSEV	25	DPWA	Multichannel
1209.5±1.1	[1] HOFERICHT...	24	RVUE	$\pi N \to \pi N$
1215 ±1	ROENCHEN	22	DPWA	Multichannel
1211 ±1 ±1	[2] SVARC	14	L+P	$\pi N \to \pi N$
1210 ±1	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1212.4	HUNT	19	DPWA	Multichannel
1218	ROENCHEN	15A	DPWA	Multichannel
1210.5±1.0	ANISOVICH	12A	DPWA	Multichannel
1211	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
1210	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
1209	[3] HOEHLER	93	ARGD	$\pi N \to \pi N$

→ UNCHECKED ←

[1] Roy-Steiner equations applied to πN scattering amplitudes and pionic atom data
[2] Fit to the amplitudes of HOEHLER 79.
[3] 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.

NODE=B033RE;LINKAGE=A
NODE=B033RE;LINKAGE=SV
NODE=B033RE;LINKAGE=HO

−2×IMAGINARY PART, MIXED CHARGES

NODE=B033IM
NODE=B033IM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
98 to 102 (≈ 100) OUR ESTIMATE				
101 ±2	SARANTSEV	25	DPWA	Multichannel
98.5±1.2	[1] HOFERICHT...	24	RVUE	$\pi N \to \pi N$
93 ±1	ROENCHEN	22	DPWA	Multichannel
98 ±2 ±1	[2] SVARC	14	L+P	$\pi N \to \pi N$
100 ±2	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
96.8	HUNT	19	DPWA	Multichannel
92	ROENCHEN	15A	DPWA	Multichannel
99 ±2	ANISOVICH	12A	DPWA	Multichannel
99	ARNDT	06	DPWA	$\pi N \to \pi N, \eta N$
100	ARNDT	04	DPWA	$\pi N \to \pi N, \eta N$
100	[3] HOEHLER	93	ARGD	$\pi N \to \pi N$

→ UNCHECKED ←

[1] Roy-Steiner equations applied to πN scattering amplitudes and pionic atom data.
[2] Fit to the amplitudes of HOEHLER 79.
[3] 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.

NODE=B033IM;LINKAGE=A
NODE=B033IM;LINKAGE=SV
NODE=B033;LINKAGE=HO

REAL PART, $\Delta(1232)^{++}$

NODE=B033R++
NODE=B033R++

VALUE (MeV)	*DOCUMENT ID*		*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1212.50±0.24	BERNICHA	96	Fit to PEDRONI 78

−2×IMAGINARY PART, $\Delta(1232)^{++}$

NODE=B033I++
NODE=B033I++

VALUE (MeV)	*DOCUMENT ID*		*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •			
97.37±0.42	BERNICHA	96	Fit to PEDRONI 78

REAL PART, $\Delta(1232)^{+}$

NODE=B033RE+
NODE=B033RE+

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1211 ±1 to 1212 ± 1	HANSTEIN	96	DPWA	$\gamma N \to \pi N$
1206.9±0.9 to 1210.5 ± 1.8	MIROSHNIC...	79		Fit photoproduction

−2×IMAGINARY PART, Δ(1232)+

NODE=B033IM+
NODE=B033IM+

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
102 ±2 to 99 ± 2	[1] HANSTEIN	96	DPWA	$\gamma N \to \pi N$
111.2±2.0 to 116.6 ± 2.2	MIROSHNIC...	79		Fit photoproduction

[1] The second (lower) value of HANSTEIN 96 here goes with the second (higher) value of the real part in the preceding data block.

NODE=B033IM+;LINKAGE=HA

REAL PART, Δ(1232)0

NODE=B033RE0
NODE=B033RE0

VALUE (MeV)	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1213.20±0.66	BERNICHA	96	Fit to PEDRONI 78

−2×IMAGINARY PART, Δ(1232)0

NODE=B033IM0
NODE=B033IM0

VALUE (MeV)	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
104.10±1.01	BERNICHA	96	Fit to PEDRONI 78

Δ(1232) ELASTIC POLE RESIDUES

NODE=B033230

ABSOLUTE VALUE, MIXED CHARGES

NODE=B033ABS
NODE=B033ABS

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
49 to 52 (≈ 50) OUR ESTIMATE				
51.3±0.9	[1] HOFERICHT...	24	RVUE	$\pi N \to \pi N$
50 ±1	ROENCHEN	22	DPWA	Multichannel
50 ±1 ±1	[2] SVARC	14	L+P	$\pi N \to \pi N$
51.6±0.6	ANISOVICH	12A	DPWA	Multichannel
53 ±2	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
46	ROENCHEN	15A	DPWA	Multichannel
52	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
53	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
50	HOEHLER	93	ARGD	$\pi N \to \pi N$

[1] Roy-Steiner equations applied to πN scattering amplitudes and pionic atom data.
[2] Fit to the amplitudes of HOEHLER 79.

NODE=B033ABS;LINKAGE=A
NODE=B033ABS;LINKAGE=SV

PHASE, MIXED CHARGES

NODE=B033PH
NODE=B033PH

→ UNCHECKED ←

VALUE (°)	DOCUMENT ID		TECN	COMMENT
−48 to −45 (≈ −46) OUR ESTIMATE				
−47.4±0.4	[1] HOFERICHT...	24	RVUE	$\pi N \to \pi N$
−39 ±1	ROENCHEN	22	DPWA	Multichannel
−46 ±1 ±1	[2] SVARC	14	L+P	$\pi N \to \pi N$
−46 ±1	ANISOVICH	12A	DPWA	Multichannel
−47 ±1	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−36	ROENCHEN	15A	DPWA	Multichannel
−47	ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
−47	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
−48	HOEHLER	93	ARGD	$\pi N \to \pi N$

[1] Roy-Steiner equations applied to πN scattering amplitudes and pionic atom data.
[2] Fit to the amplitudes of HOEHLER 79.

NODE=B033PH;LINKAGE=A
NODE=B033PH;LINKAGE=SV

Δ(1232) BREIT-WIGNER MASSES

NODE=B033205

MIXED CHARGES

NODE=B033M
NODE=B033M

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1230 to 1234 (≈ 1232) OUR ESTIMATE				
1230 ±1	SARANTSEV	25	DPWA	Multichannel
1230.8±0.4	[1] HUNT	19	DPWA	Multichannel
1233.4±0.4	[1] ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
1232 ±3	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
1233 ±2	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1228 ±2	ANISOVICH	12A	DPWA	Multichannel
1231.1±0.2	[1] SHRESTHA	12A	DPWA	Multichannel
1232.9±1.2	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
1228 ±1	PENNER	02C	DPWA	Multichannel

[1] Statistical error only.

NODE=B033M;LINKAGE=A

$\Delta(1232)^{++}$ MASS

NODE=B033M++

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1230.55±0.20	GRIDNEV	06	DPWA	$\pi N \to \pi N$
1231.88±0.29	BERNICHA	96		Fit to PEDRONI 78
1230.5 ±0.2	ABAEV	95	IPWA	$\pi N \to \pi N$
1230.9 ±0.3	KOCH	80B	IPWA	$\pi N \to \pi N$
1231.1 ±0.2	PEDRONI	78		$\pi N \to \pi N$ 70–370 MeV

$\Delta(1232)^{+}$ MASS

NODE=B033M+

VALUE (MeV)	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1234.9±1.4	MIROSHNIC...	79	Fit photoproduction

$\Delta(1232)^{0}$ MASS

NODE=B033M0

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1231.3 ±0.6	BREITSCHOP...	06	CNTR	Using new CHEX data
1233.40±0.22	GRIDNEV	06	DPWA	$\pi N \to \pi N$
1234.35±0.75	BERNICHA	96		Fit to PEDRONI 78
1233.1 ±0.3	ABAEV	95	IPWA	$\pi N \to \pi N$
1233.6 ±0.5	KOCH	80B	IPWA	$\pi N \to \pi N$
1233.8 ±0.2	PEDRONI	78		$\pi N \to \pi N$ 70–370 MeV

$m_{\Delta^0} - m_{\Delta^{++}}$

NODE=B033D

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.86±0.30	GRIDNEV	06	DPWA	$\pi N \to \pi N$
2.25±0.68	BERNICHA	96		Fit to PEDRONI 78
2.6 ±0.4	ABAEV	95	IPWA	$\pi N \to \pi N$
2.7 ±0.3	[1] PEDRONI	78		See the masses

[1] Using $\pi^{\pm} d$ as well, PEDRONI 78 determine $(M^- - M^{++}) + (M^0 - M^+)/3 = 4.6 \pm 0.2$ MeV.

NODE=B033;LINKAGE=A

$\Delta(1232)$ BREIT-WIGNER WIDTHS

NODE=B033210

MIXED CHARGES

NODE=B033W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
114 to 120 (≈ 117) OUR ESTIMATE				
116 ±2	SARANTSEV	25	DPWA	Multichannel
110.9±0.8	[1] HUNT	19	DPWA	Multichannel
118.7±0.6	[1] ARNDT	06	DPWA	$\pi N \to \pi N$, ηN
120 ±5	CUTKOSKY	80	IPWA	$\pi N \to \pi N$
116 ±5	HOEHLER	79	IPWA	$\pi N \to \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
110 ±3	ANISOVICH	12A	DPWA	Multichannel
113.0±0.5	[1] SHRESTHA	12A	DPWA	Multichannel
118.0±2.2	ARNDT	04	DPWA	$\pi N \to \pi N$, ηN
106 ±1	PENNER	02C	DPWA	Multichannel

→ UNCHECKED ←

[1] Statistical error only.

NODE=B033W;LINKAGE=A

$\Delta(1232)^{++}$ WIDTH

NODE=B033W++

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
112.2 ±0.7	GRIDNEV	06	DPWA	$\pi N \to \pi N$
109.07±0.48	BERNICHA	96		Fit to PEDRONI 78
111.0 ±1.0	KOCH	80B	IPWA	$\pi N \to \pi N$
111.3 ±0.5	PEDRONI	78		$\pi N \to \pi N$ 70–370 MeV

$\Delta(1232)^{+}$ WIDTH

NODE=B033W+

VALUE (MeV)	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
131.1±2.4	MIROSHNIC...	79	Fit photoproduction

Δ(1232)^0 WIDTH

NODE=B033W0
NODE=B033W0

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
112.5 ±1.9	BREITSCHOP...	06	CNTR	Using new CHEX data
116.9 ±0.7	GRIDNEV	06	DPWA	$\pi N \rightarrow \pi N$
117.58±1.16	BERNICHA	96		Fit to PEDRONI 78
113.0 ±1.5	KOCH	80B	IPWA	$\pi N \rightarrow \pi N$
117.9 ±0.9	PEDRONI	78		$\pi N \rightarrow \pi N$ 70–370 MeV

Δ^0-Δ^{++} WIDTH DIFFERENCE

NODE=B033WD

NODE=B033WD

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
4.66±1.0	GRIDNEV	06	DPWA	$\pi N \rightarrow \pi N$
8.45±1.11	BERNICHA	96		Fit to PEDRONI 78
5.1 ±1.0	ABAEV	95	IPWA	$\pi N \rightarrow \pi N$
6.6 ±1.0	PEDRONI	78		See the widths

Δ(1232) DECAY MODES

NODE=B033245;NODE=B033

The following branching fractions are our estimates, not fits or averages.

NODE=B033

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\pi$	99.4 %	DESIG=1;OUR EST
Γ_2	$N\gamma$	0.55–0.65 %	DESIG=3;OUR EST
Γ_3	$N\gamma$, helicity=1/2	0.11–0.13 %	DESIG=4;OUR EST
Γ_4	$N\gamma$, helicity=3/2	0.44–0.52 %	DESIG=5;OUR EST
Γ_5	$p e^+ e^-$	$(4.2\pm0.7)\times10^{-5}$	DESIG=6

Δ(1232) BRANCHING RATIOS

NODE=B033250

$\Gamma(N\pi)/\Gamma_{total}$ Γ_1/Γ

NODE=B033R1
NODE=B033R1
→ UNCHECKED ←

VALUE	DOCUMENT ID		TECN	COMMENT
0.994 OUR ESTIMATE				
0.9939±0.0001	[1] HUNT	19	DPWA	Multichannel
1.00	ARNDT	06	DPWA	$\pi N \rightarrow \pi N$, ηN
1.0	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$
1.0	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.994	SHRESTHA	12A	DPWA	Multichannel
1.0	ANISOVICH	10	DPWA	Multichannel
1.000	ARNDT	04	DPWA	$\pi N \rightarrow \pi N$, ηN
1.00	PENNER	02C	DPWA	Multichannel

[1] Statistical error only.

NODE=B033R1;LINKAGE=A

$\Gamma(p e^+ e^-)/\Gamma_{total}$ Γ_5/Γ

NODE=B033R00
NODE=B033R00

VALUE (units 10^{-5})	DOCUMENT ID	
4.19±0.34±0.62	[1] ADAMCZEW...	17

[1] The systematic uncertainty includes the model dependence.

NODE=B033R00;LINKAGE=A

Δ(1232) PHOTON DECAY AMPLITUDES AT THE POLE

NODE=B033260

Δ(1232) → $N\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B033PA1
NODE=B033PA1

MODULUS (GeV$^{-1/2}$)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
−0.133±0.003	−17 ± 2	SARANTSEV	25	DPWA	Multichannel
−0.126±0.002	−18 ± 2	ROENCHEN	22	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−0.117	−6.6	ROENCHEN	15A	DPWA	Multichannel

$\Delta(1232) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B033PA2
NODE=B033PA2

MODULUS ($GeV^{-1/2}$)	PHASE ($^\circ$)	DOCUMENT ID		TECN	COMMENT
-0.255 ± 0.005	-10 ± 2	SARANTSEV	25	DPWA	Multichannel
-0.245 ± 0.004	-0.7 ± 0.9	ROENCHEN	22	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
-0.226	2.8	ROENCHEN	15A	DPWA	Multichannel

$\Delta(1232)$ BREIT-WIGNER PHOTON DECAY AMPLITUDES

NODE=B033255

Papers on γN amplitudes predating 1981 may be found in our 2006 edition, Journal of Physics **G33** 1 (2006).

NODE=B033255

$\Delta(1232) \rightarrow N\gamma$, helicity-1/2 amplitude $A_{1/2}$

NODE=B033A1
NODE=B033A1

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
-0.142 to -0.129 (≈ -0.135) OUR ESTIMATE				
-0.135 ± 0.003	SARANTSEV	25	DPWA	Multichannel
-0.146 ± 0.002	[1] HUNT	19	DPWA	Multichannel
-0.139 ± 0.002	[1] WORKMAN	12A	DPWA	$\gamma N \rightarrow N\pi$
-0.139 ± 0.004	[1] DUGGER	07	DPWA	$\gamma N \rightarrow \pi N$
-0.137 ± 0.005	AHRENS	04A	DPWA	$\vec{\gamma}\vec{p} \rightarrow N\pi$
$-0.1357 \pm 0.0013 \pm 0.0037$	BLANPIED	01	LEGS	$\gamma p \rightarrow p\gamma, p\pi^0, n\pi^+$
-0.131 ± 0.001	[1] BECK	00	IPWA	$\vec{\gamma} p \rightarrow p\pi^0, n\pi^+$
-0.140 ± 0.005	KAMALOV	99	DPWA	$\gamma N \rightarrow \pi N$
-0.1294 ± 0.0013	HANSTEIN	98	IPWA	$\gamma N \rightarrow \pi N$
-0.1278 ± 0.0012	DAVIDSON	97	DPWA	$\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.131 ± 0.004	ANISOVICH	12A	DPWA	Multichannel
-0.137 ± 0.001	[1] SHRESTHA	12A	DPWA	Multichannel
-0.140	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$
-0.129 ± 0.001	ARNDT	02	DPWA	$\gamma p \rightarrow N\pi$
-0.128	PENNER	02D	DPWA	Multichannel
-0.1312	HANSTEIN	98	DPWA	$\gamma N \rightarrow \pi N$

→ UNCHECKED ←

OCCUR=2

[1] Statistical error only.

NODE=B033A1;LINKAGE=B

$\Delta(1232) \rightarrow N\gamma$, helicity-3/2 amplitude $A_{3/2}$

NODE=B033A2
NODE=B033A2

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
-0.262 to -0.248 (≈ -0.255) OUR ESTIMATE				
-0.259 ± 0.005	SARANTSEV	25	DPWA	Multichannel
-0.250 ± 0.002	[1] HUNT	19	DPWA	Multichannel
-0.262 ± 0.003	WORKMAN	12A	DPWA	$\gamma N \rightarrow N\pi$
-0.258 ± 0.005	DUGGER	07	DPWA	$\gamma N \rightarrow \pi N$
-0.256 ± 0.003	AHRENS	04A	DPWA	$\vec{\gamma}\vec{p} \rightarrow N\pi$
$-0.2669 \pm 0.0016 \pm 0.0078$	BLANPIED	01	LEGS	$\gamma p \rightarrow p\gamma, p\pi^0, n\pi^+$
-0.251 ± 0.001	BECK	00	IPWA	$\vec{\gamma} p \rightarrow p\pi^0, n\pi^+$
-0.258 ± 0.006	KAMALOV	99	DPWA	$\gamma N \rightarrow \pi N$
-0.2466 ± 0.0013	HANSTEIN	98	IPWA	$\gamma N \rightarrow \pi N$
-0.2524 ± 0.0013	DAVIDSON	97	DPWA	$\gamma N \rightarrow \pi N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.254 ± 0.005	ANISOVICH	12A	DPWA	Multichannel
-0.251 ± 0.001	[1] SHRESTHA	12A	DPWA	Multichannel
-0.265	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$
-0.243 ± 0.001	ARNDT	02	DPWA	$\gamma p \rightarrow N\pi$
-0.247	PENNER	02D	DPWA	Multichannel
-0.2522	HANSTEIN	98	DPWA	$\gamma N \rightarrow \pi N$

→ UNCHECKED ←

OCCUR=2

[1] Statistical error only.

NODE=B033A2;LINKAGE=B

$\Delta(1232) \rightarrow N\gamma$, E_2/M_1 ratio

NODE=B033EMR
NODE=B033EMR

VALUE	DOCUMENT ID		TECN	COMMENT
-0.028 to -0.022 (≈ -0.025) OUR ESTIMATE				
$-0.0238 \pm 0.0016 \pm 0.0010$	MORNACCHI	24	DPWA	$\vec{\gamma}\vec{p} \rightarrow N\pi$
$-0.0274 \pm 0.0003 \pm 0.0030$	AHRENS	04A	DPWA	$\vec{\gamma}\vec{p} \rightarrow N\pi$
-0.020 ± 0.002	ARNDT	02	DPWA	$\gamma p \rightarrow N\pi$
$-0.0307 \pm 0.0026 \pm 0.0024$	BLANPIED	01	LEGS	$\gamma p \rightarrow p\gamma, p\pi^0, n\pi^+$
$-0.016 \pm 0.004 \pm 0.002$	GALLER	01	DPWA	$\gamma p \rightarrow \gamma p$
$-0.025 \pm 0.001 \pm 0.002$	BECK	00	IPWA	$\vec{\gamma} p \rightarrow p\pi^0, n\pi^+$
-0.0233 ± 0.0017	HANSTEIN	98	IPWA	$\gamma N \rightarrow \pi N$
-0.015 ± 0.005	[1] ARNDT	97	IPWA	$\gamma N \rightarrow \pi N$
-0.0319 ± 0.0024	DAVIDSON	97	DPWA	$\gamma N \rightarrow \pi N$

→ UNCHECKED ←

OCCUR=2

• • • We do not use the following data for averages, fits, limits, etc. • • •

-0.022	DRECHSEL	07	DPWA	$\gamma N \rightarrow \pi N$
-0.026	PENNER	02D	DPWA	Multichannel
-0.0254 ± 0.0010	HANSTEIN	98	DPWA	$\gamma N \rightarrow \pi N$
$-0.025 \pm 0.002 \pm 0.002$	BECK	97	IPWA	$\gamma N \rightarrow \pi N$
$-0.030 \pm 0.003 \pm 0.002$	BLANPIED	97	DPWA	$\gamma N \rightarrow \pi N, \gamma N$

[1] This ARNDT 97 value is very sensitive to the database being fitted. The result is from a fit to the full pion photoproduction database, apart from the BLANPIED 97 cross-section measurements. NODE=B033EMR;LINKAGE=A

$\Delta(1232) \rightarrow N\gamma$, absolute value of E_2/M_1 ratio at pole

NODE=B033EMA
NODE=B033EMA

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.065 ± 0.007	ARNDT	97	DPWA	$\gamma N \rightarrow \pi N$
0.058	HANSTEIN	96	DPWA	$\gamma N \rightarrow \pi N$

$\Delta(1232) \rightarrow N\gamma$, phase of E_2/M_1 ratio at pole

NODE=B033EMP
NODE=B033EMP

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-122 ± 5	ARNDT	97	DPWA	$\gamma N \rightarrow \pi N$
-127.2	HANSTEIN	96	DPWA	$\gamma N \rightarrow \pi N$

$\Delta(1232)$ MAGNETIC MOMENTS

NODE=B033240

$\Delta(1232)^{++}$ MAGNETIC MOMENT

NODE=B033MM

The values are extracted from UCLA and SIN data on $\pi^+ p$ bremsstrahlung using a variety of different theoretical approximations and methods. Our estimate is *only* a rough guess of the range we expect the moment to lie within. NODE=B033MM

NODE=B033MM

VALUE (μ_N)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.14 ± 0.51	LOPEZCAST...	01	DPWA	$\pi^+ p \rightarrow \pi^+ p\gamma$
$4.52 \pm 0.50 \pm 0.45$	BOSSHARD	91		$\pi^+ p \rightarrow \pi^+ p\gamma$ (SIN data)
3.7 to 4.2	LIN	91B		$\pi^+ p \rightarrow \pi^+ p\gamma$ (from UCLA data)
4.6 to 4.9	LIN	91B		$\pi^+ p \rightarrow \pi^+ p\gamma$ (from SIN data) OCCUR=2
5.6 to 7.5	WITTMAN	88		$\pi^+ p \rightarrow \pi^+ p\gamma$ (from UCLA data)
6.9 to 9.8	HELLER	87		$\pi^+ p \rightarrow \pi^+ p\gamma$ (from UCLA data)
4.7 to 6.7	NEFKENS	78		$\pi^+ p \rightarrow \pi^+ p\gamma$ (UCLA data)

$\Delta(1232)^{+}$ MAGNETIC MOMENT

NODE=B033MM+
NODE=B033MM+

VALUE (μ_N)	DOCUMENT ID		COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$2.7^{+1.0}_{-1.3} \pm 1.5 \pm 3$	[1] KOTULLA	02	$\gamma p \rightarrow p\pi^0\gamma'$

[1] The second error is systematic, the third is an estimate of theoretical uncertainties. NODE=B033MM+;LINKAGE=A

$\Delta(1232)$ REFERENCES

NODE=B033

For early references, see Physics Letters **111B** 1 (1982). NODE=B033

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