$N(2120)\ 3/2^-$

$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$ Status: **

OMITTED FROM SUMMARY TABLE

Before the 2012 *Review*, all the evidence for a $J^P = 3/2^-$ state with a mass above 1800 MeV was filed under a two-star $N(2080)$. There is now evidence from ANISOVICH 12A for two $3/2^-$ states in this region, so we have split the older data (according to mass) between a three-star $N(1875)$ and a two-star $N(2120)$.

$N(2120)$ BREIT-WIGNER MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2120 OUR ESTIMATE				
2120±35	GUTZ	14	DPWA	Multichannel
2150±60	ANISOVICH	12A	DPWA	Multichannel
2060±80	[1] CUTKOSKY	80	IPWA	$\pi N \to \pi N$
2081±20	HOEHLER	79	IPWA	$\pi N \to \pi N$

$N(2120)$ BREIT-WIGNER WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
340± 35	GUTZ	14	DPWA	Multichannel
330± 45	ANISOVICH	12A	DPWA	Multichannel
300±100	CUTKOSKY	80	IPWA	$\pi N \to \pi N$ (higher m)
265± 40	HOEHLER	79	IPWA	$\pi N \to \pi N$

$N(2120)$ POLE POSITION

REAL PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2115±40	GUTZ	14	DPWA	Multichannel
2110±50	ANISOVICH	12A	DPWA	Multichannel
2050±70	CUTKOSKY	80	IPWA	$\pi N \to \pi N$ (higher m)

−2×IMAGINARY PART

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
345±35	GUTZ	14	DPWA	Multichannel
340±45	ANISOVICH	12A	DPWA	Multichannel
200±80	CUTKOSKY	80	IPWA	$\pi N \to \pi N$ (higher m)

$N(2120)$ ELASTIC POLE RESIDUE

MODULUS $|r|$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
11± 6	GUTZ	14	DPWA	Multichannel
13± 3	ANISOVICH	12A	DPWA	Multichannel
30±20	CUTKOSKY	80	IPWA	$\pi N \to \pi N$ (higher m)

PHASE θ

VALUE (°)	DOCUMENT ID		TECN	COMMENT
$-30\pm$ 20	GUTZ	14	DPWA	Multichannel
$-20\pm$ 10	ANISOVICH	12A	DPWA	Multichannel
0 ± 100	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$ (higher m)

$N(2120)$ INELASTIC POLE RESIDUE

The "normalized residue" is the residue divided by $\Gamma_{pole}/2$.

Normalized residue in $N\pi \rightarrow N(2120) \rightarrow \Lambda K$

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
3 ± 1	100 ± 30	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(2120) \rightarrow \Sigma K$

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
2 ± 1.5	-50 ± 40	ANISOVICH	12A	DPWA	Multichannel

Normalized residue in $N\pi \rightarrow N(2120) \rightarrow N(1535)\pi$

MODULUS (%)	PHASE (°)	DOCUMENT ID		TECN	COMMENT
15 ± 8	**-90 ± 40**	GUTZ	14	DPWA	Multichannel

$N(2120)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\pi$	
Γ_2	$N(1535)\pi$	(15 ± 8) %

$N(2120)$ BRANCHING RATIOS

$\Gamma(N\pi)/\Gamma_{total}$ Γ_1/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
5 ± 3	GUTZ	14	DPWA	Multichannel
6 ± 2	ANISOVICH	12A	DPWA	Multichannel
14 ± 7	CUTKOSKY	80	IPWA	$\pi N \rightarrow \pi N$ (higher m)
6 ± 2	HOEHLER	79	IPWA	$\pi N \rightarrow \pi N$

$\Gamma(N(1535)\pi)/\Gamma_{total}$ Γ_2/Γ

VALUE (%)	DOCUMENT ID		TECN	COMMENT
15 ± 8	GUTZ	14	DPWA	Multichannel

$N(2120)$ PHOTON DECAY AMPLITUDES

$N(2120) \rightarrow p\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	DOCUMENT ID		TECN	COMMENT
0.130 ± 0.050	GUTZ	14	DPWA	Multichannel
0.125 ± 0.045	[2] ANISOVICH	12A	DPWA	Phase $= (-55 \pm 20)^\circ$

$N(2120) \rightarrow p\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.160 ± 0.065	GUTZ	14	DPWA	Multichannel
0.150 ± 0.060	[2] ANISOVICH	12A	DPWA	Phase = $(-35 \pm 15)^\circ$

$N(2120) \rightarrow n\gamma$, helicity-1/2 amplitude $A_{1/2}$

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.110 ± 0.045	ANISOVICH	13B	DPWA	Multichannel

$N(2120) \rightarrow n\gamma$, helicity-3/2 amplitude $A_{3/2}$

VALUE ($GeV^{-1/2}$)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.040 ± 0.030	ANISOVICH	13B	DPWA	Multichannel

N(2120) FOOTNOTES

[1] CUTKOSKY 80 finds a lower mass D_{13} resonance, as well as one in this region. Both are listed here.

[2] This ANISOVICH 12A value is the complex helicity amplitude at the pole position.

N(2120) REFERENCES

GUTZ	14	EPJ A50 74	E. Gutz *et al.*	(CBELSA/TAPS Collab.)
ANISOVICH	13B	EPJ A49 67	A.V. Anisovich *et al.*	
ANISOVICH	12A	EPJ A48 15	A.V. Anisovich *et al.*	(BONN, PNPI)
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky *et al.*	(CMU, LBL)
HOEHLER	79	PDAT 12-1	G. Hohler *et al.*	(KARLT)