NODE=B035

$\Lambda(2110)\ 5/2^+$

$I(J^P) = 0(\frac{5}{2}^+)$ Status: ***

For results published before 1974 (they are now obsolete), see our 1982 edition Physics Letters **111B** 1 (1982). All the references have been retained. NODE=B035

This resonance is in the Baryon Summary Table, but the evidence for it could be better.

$\Lambda(2110)$ POLE POSITION

NODE=B035225

REAL PART

NODE=B035RE
NODE=B035RE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2048±10	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1970	ZHANG	13A	DPWA	$\overline{K}N$ multichannel

−2×IMAGINARY PART

NODE=B035IM
NODE=B035IM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
255±20	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
350	ZHANG	13A	DPWA	$\overline{K}N$ multichannel

$\Lambda(2110)$ POLE RESIDUE

NODE=B035250

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

NODE=B035250

Normalized residue in $N\overline{K} \to \Lambda(2110) \to N\overline{K}$

NODE=B035A00
NODE=B035A00

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.020±0.005	**5 ± 15**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(2110) \to \Sigma\pi$

NODE=B035A01
NODE=B035A01

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.13±0.03	**0 ± 15**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(2110) \to \Xi K$

NODE=B035A02
NODE=B035A02

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.005±0.005		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(2110) \to \Lambda\omega$, S=1/2, P-wave

NODE=B035A04
NODE=B035A04

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.01±0.01		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(2110) \to \Lambda\omega$, S=3/2, P-wave

NODE=B035A03
NODE=B035A03

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.03±0.01	**−7 ± 16**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(2110) \to \Lambda\omega$, S=3/2, F-wave

NODE=B035A05
NODE=B035A05

MODULUS	*PHASE (°)*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.01±0.01		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Lambda(2110)$ MASS

NODE=B035M

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2050 to 2130 (≈ 2090) OUR ESTIMATE				
2086±12	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
2036±13	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
2092±25	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
2125±25	CAMERON	78B	DPWA	$K^-p \to N\overline{K}^*$
2106±50	DEBELLEFON	78	DPWA	$\overline{K}N \to \overline{K}N$
2140±20	DEBELLEFON	77	DPWA	$K^-p \to \Sigma\pi$
2100±50	GOPAL	77	DPWA	$\overline{K}N$ multichannel
2112± 7	KANE	74	DPWA	$K^-p \to \Sigma\pi$

NODE=B035M

→ UNCHECKED ←

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

2137	BACCARI	77	DPWA	$K^- p \to \Lambda\omega$
2103	[1] NAKKASYAN	75	DPWA	$K^- p \to \Lambda\omega$

Λ(2110) WIDTH

NODE=B035W

NODE=B035W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
200 to 300 (≈ 250) OUR ESTIMATE				→ UNCHECKED ←
274±25	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
400±38	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
245±25	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
160±30	CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$
251±50	DEBELLEFON	78	DPWA	$\overline{K}N \to \overline{K}N$
140±20	DEBELLEFON	77	DPWA	$K^- p \to \Sigma\pi$
200±50	GOPAL	77	DPWA	$\overline{K}N$ multichannel
190±30	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
132	BACCARI	77	DPWA	$K^- p \to \Lambda\omega$
391	[1] NAKKASYAN	75	DPWA	$K^- p \to \Lambda\omega$

Λ(2110) DECAY MODES

NODE=B035215;NODE=B035

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\overline{K}$	5–25 %	DESIG=1;OUR EST
Γ_2	$\Sigma\pi$	10–40 %	DESIG=2;OUR EST
Γ_3	$\Lambda\omega$	seen	DESIG=3;OUR EST
Γ_4	$\Lambda\omega$, S=1/2 , P-wave		DESIG=10
Γ_5	$\Lambda\omega$, S=3/2 , P-wave	(5.0±2.0) %	DESIG=11
Γ_6	$\Lambda\omega$, S=3/2 , F-wave		DESIG=12
Γ_7	ΞK		DESIG=9
Γ_8	$\Sigma(1385)\pi$	seen	DESIG=4;OUR EST
Γ_9	$\Sigma(1385)\pi$, P-wave		DESIG=6
Γ_{10}	$N\overline{K}^*(892)$	10–60 %	DESIG=5;OUR EST
Γ_{11}	$N\overline{K}^*(892)$, S=1/2		DESIG=7
Γ_{12}	$N\overline{K}^*(892)$, S=3/2, P-wave		DESIG=8

Λ(2110) BRANCHING RATIOS

NODE=B035220

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

NODE=B035220

$\Gamma(N\overline{K})/\Gamma_{total}$ Γ_1/Γ

NODE=B035R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.05 to 0.25 OUR ESTIMATE				→ UNCHECKED ←
0.020±0.005	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.083±0.005	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
0.07 ±0.03	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.27 ±0.06	[2] DEBELLEFON	78	DPWA	$\overline{K}N \to \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.07 ±0.03	GOPAL	77	DPWA	See GOPAL 80

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

NODE=B035R00

VALUE	DOCUMENT ID		TECN	COMMENT
0.88±0.20	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda\omega, S$=1/2 , P-wave$)/\Gamma_{total}$ Γ_4/Γ

NODE=B035R03

VALUE	DOCUMENT ID		TECN	COMMENT
<0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

NODE=B035R04

VALUE	DOCUMENT ID		TECN	COMMENT
0.05±0.02	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda\omega, S$=3/2 , F-wave$)/\Gamma_{total}$ Γ_6/Γ

NODE=B035R05

VALUE	DOCUMENT ID		TECN	COMMENT
<0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Xi K)/\Gamma_{total}$ Γ_7/Γ

NODE=B035R02
NODE=B035R02

VALUE	DOCUMENT ID		TECN	COMMENT
~ 0	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2110) \to \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

NODE=B035R1
NODE=B035R1

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.04 \pm 0.01$	ZHANG	13A	DPWA	Multichannel
$+0.14 \pm 0.01$	DEBELLEFON	77	DPWA	$K^- p \to \Sigma\pi$
$+0.20 \pm 0.03$	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$+0.10 \pm 0.03$	GOPAL	77	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2110) \to \Lambda\omega$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B035R3
NODE=B035R3

VALUE	DOCUMENT ID		TECN	COMMENT
<0.05	BACCARI	77	DPWA	$K^- p \to \Lambda\omega$
0.112	[1] NAKKASYAN	75	DPWA	$K^- p \to \Lambda\omega$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2110) \to \Sigma(1385)\pi$, P-wave $(\Gamma_1\Gamma_9)^{1/2}/\Gamma$

NODE=B035R4
NODE=B035R4

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.04 \pm 0.01$	ZHANG	13A	DPWA	Multichannel
$+0.071 \pm 0.025$	[3] CAMERON	78	DPWA	$K^- p \to \Sigma(1385)\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2110) \to N\overline{K}^*(892)$, S=1/2 $(\Gamma_1\Gamma_{11})^{1/2}/\Gamma$

NODE=B035R5
NODE=B035R5

VALUE	DOCUMENT ID		TECN	COMMENT
-0.09 ± 0.01	ZHANG	13A	DPWA	Multichannel
-0.17 ± 0.04	[4] CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2110) \to N\overline{K}^*(892)$, S=3/2, P-wave $(\Gamma_1\Gamma_{12})^{1/2}/\Gamma$

NODE=B035R01
NODE=B035R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.24 ± 0.01	ZHANG	13A	DPWA	Multichannel

$\Lambda(2110)$ FOOTNOTES

NODE=B035

[1] Found in one of two best solutions.
NODE=B035;LINKAGE=A

[2] The published error of 0.6 was a misprint.
NODE=B035;LINKAGE=C

[3] The CAMERON 78 upper limit on F-wave decay is 0.03. The sign here has been changed to be in accord with the baryon-first convention.
NODE=B035;LINKAGE=D

[4] The published sign has been changed to be in accord with the baryon-first convention. The CAMERON 78B upper limits on the P_3 and F_3 waves are each 0.03.
NODE=B035;LINKAGE=E

$\Lambda(2110)$ REFERENCES

NODE=B035

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=59986
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)	REFID=55441
PDG	82	PL 111B 1	M. Roos *et al.*	(HELS, CIT, CERN)	REFID=41167
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP	REFID=31755
CAMERON	78	NP B143 189	W. Cameron *et al.*	(RHEL, LOIC) IJP	REFID=31837
CAMERON	78B	NP B146 327	W. Cameron *et al.*	(RHEL, LOIC) IJP	REFID=31838
DEBELLEFON	78	NC 42A 403	A. de Bellefon *et al.*	(CDEF, SACL) IJP	REFID=31968
BACCARI	77	NC 41A 96	B. Baccari *et al.*	(SACL, CDEF) IJP	REFID=31932
DEBELLEFON	77	NC 37A 175	A. de Bellefon *et al.*	(CDEF, SACL) IJP	REFID=31985
GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(LOIC, RHEL) IJP	REFID=31750
NAKKASYAN	75	NP B93 85	A. Nakkasyan	(CERN) IJP	REFID=31931
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP	REFID=31759