

$\Lambda(2110) 5/2^+$  $I(J^P) = 0(\frac{5}{2}^+)$  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.

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

 **$\Lambda(2110)$  POLE POSITION****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1970	ZHANG	13A	DPWA Multichannel

**–2×IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
350	ZHANG	13A	DPWA Multichannel

 **$\Lambda(2110)$  MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2090 to 2140 (<math>\approx</math> 2110) OUR ESTIMATE</b>			
2036 ± 13	ZHANG	13A	DPWA Multichannel
2092 ± 25	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
2125 ± 25	CAMERON	78B	DPWA $K^- p \rightarrow N\bar{K}^*$
2106 ± 50	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
2140 ± 20	DEBELLEFON	77	DPWA $K^- p \rightarrow \Sigma\pi$
2100 ± 50	GOPAL	77	DPWA $\bar{K}N$ multichannel
2112 ± 7	KANE	74	DPWA $K^- p \rightarrow \Sigma\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2137	BACCARI	77	DPWA $K^- p \rightarrow \Lambda\omega$
2103	<sup>1</sup> NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

 **$\Lambda(2110)$  WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>150 to 250 (<math>\approx</math> 200) OUR ESTIMATE</b>			
400 ± 38	ZHANG	13A	DPWA Multichannel
245 ± 25	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
160 ± 30	CAMERON	78B	DPWA $K^- p \rightarrow N\bar{K}^*$
251 ± 50	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
140 ± 20	DEBELLEFON	77	DPWA $K^- p \rightarrow \Sigma\pi$
200 ± 50	GOPAL	77	DPWA $\bar{K}N$ multichannel
190 ± 30	KANE	74	DPWA $K^- p \rightarrow \Sigma\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			

132	BACCARI	77	DPWA	$K^- p \rightarrow \Lambda\omega$
391	<sup>1</sup> NAKKASYAN	75	DPWA	$K^- p \rightarrow \Lambda\omega$

### $\Lambda(2110)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	5–25 %
$\Gamma_2$ $\Sigma\pi$	10–40 %
$\Gamma_3$ $\Lambda\omega$	seen
$\Gamma_4$ $\Sigma(1385)\pi$	seen
$\Gamma_5$ $\Sigma(1385)\pi$ , <i>P</i> -wave	
$\Gamma_6$ $N\bar{K}^*(892)$	10–60 %
$\Gamma_7$ $N\bar{K}^*(892)$ , $S=1/2$	
$\Gamma_8$ $N\bar{K}^*(892)$ , $S=3/2$ , <i>P</i> -wave	

### $\Lambda(2110)$ BRANCHING RATIOS

See “Sign conventions for resonance couplings” in the Note on  $\Lambda$  and  $\Sigma$  Resonances.

#### $\Gamma(N\bar{K})/\Gamma_{\text{total}}$ $\Gamma_1/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.05 to 0.25 OUR ESTIMATE</b>			
$0.083 \pm 0.005$	ZHANG	13A	DPWA Multichannel
$0.07 \pm 0.03$	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
$0.27 \pm 0.06$	<sup>2</sup> DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.07 \pm 0.03$	GOPAL	77	DPWA See GOPAL 80

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

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

#### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Lambda\omega$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$<0.05$	BACCARI	77	DPWA $K^- p \rightarrow \Lambda\omega$
0.112	<sup>1</sup> NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

#### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Sigma(1385)\pi$ , *P*-wave $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$+0.04 \pm 0.01$	ZHANG	13A	DPWA Multichannel
$+0.071 \pm 0.025$	<sup>3</sup> CAMERON	78	DPWA $K^- p \rightarrow \Sigma(1385)\pi$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(2110) \rightarrow N\bar{K}^*(892)$ ,  $S=1/2$   $(\Gamma_1 \Gamma_7)^{1/2} / \Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$-0.09 \pm 0.01$	ZHANG	13A	DPWA Multichannel
$-0.17 \pm 0.04$	<sup>4</sup> CAMERON	78B	DPWA $K^- p \rightarrow N\bar{K}^*$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(2110) \rightarrow N\bar{K}^*(892)$ ,  $S=3/2$ ,  $P$ -wave  $(\Gamma_1 \Gamma_8)^{1/2} / \Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.24 \pm 0.01$	ZHANG	13A	DPWA Multichannel

### $\Lambda(2110)$ FOOTNOTES

- <sup>1</sup> Found in one of two best solutions.
- <sup>2</sup> The published error of 0.6 was a misprint.
- <sup>3</sup> 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.
- <sup>4</sup> 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.

### $\Lambda(2110)$ REFERENCES

ZHANG	13A	PR C88 035205	H. Zhang <i>et al.</i>	(KSU)
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, CIT, CERN)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
CAMERON	78	NP B143 189	W. Cameron <i>et al.</i>	(RHEL, LOIC) IJP
CAMERON	78B	NP B146 327	W. Cameron <i>et al.</i>	(RHEL, LOIC) IJP
DEBELLEFON	78	NC 42A 403	A. de Bellefon <i>et al.</i>	(CDEF, SACL) IJP
BACCARI	77	NC 41A 96	B. Baccari <i>et al.</i>	(SACL, CDEF) IJP
DEBELLEFON	77	NC 37A 175	A. de Bellefon <i>et al.</i>	(CDEF, SACL) IJP
GOPAL	77	NP B119 362	G.P. Gopal <i>et al.</i>	(LOIC, RHEL) IJP
NAKKASYAN	75	NP B93 85	A. Nakkasyan	(CERN) IJP
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP