

$\Lambda(2110) F_{05}$

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

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

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

### $\Lambda(2110)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>2090 to 2140 (<math>\approx</math> 2110) OUR ESTIMATE</b>			
2092 $\pm$ 25	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
2125 $\pm$ 25	CAMERON	78B	DPWA $K^-p \rightarrow N\bar{K}^*$
2106 $\pm$ 50	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
2140 $\pm$ 20	DEBELLEFON	77	DPWA $K^-p \rightarrow \Sigma\pi$
2100 $\pm$ 50	GOPAL	77	DPWA $\bar{K}N$ multichannel
2112 $\pm$ 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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>150 to 250 (<math>\approx</math> 200) OUR ESTIMATE</b>			
245 $\pm$ 25	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
160 $\pm$ 30	CAMERON	78B	DPWA $K^-p \rightarrow N\bar{K}^*$
251 $\pm$ 50	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
140 $\pm$ 20	DEBELLEFON	77	DPWA $K^-p \rightarrow \Sigma\pi$
200 $\pm$ 50	GOPAL	77	DPWA $\bar{K}N$ multichannel
190 $\pm$ 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 %
$\Gamma_7$	$N\bar{K}^*(892)$ , <i>S</i> =1/2, <i>F</i> -wave	

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

## $\Lambda(2110)$ BRANCHING RATIOS

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.05 to 0.25 OUR ESTIMATE</b>			
$0.07 \pm 0.03$	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 $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$+0.14 \pm 0.01$	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 $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Lambda\omega$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$<0.05$	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 $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Sigma(1385)\pi$ $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

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

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow N\bar{K}^*(892)$ $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

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

## $\Lambda(2110)$ 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

PDG	82	PL 111B	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

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