

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

### $\Lambda(2110)$ 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 $\pm$ 13	ZHANG	13A	DPWA Multichannel
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

<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 $\pm$ 38	ZHANG	13A	DPWA Multichannel
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 $K^-p \rightarrow \Lambda\omega$

### $\Lambda(2110)$ 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**

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

**$\Lambda(2110)$  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	
$\Gamma_8$ $N\bar{K}^*(892)$ , <i>S</i> =3/2, <i>P</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.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	$\Gamma_1/\Gamma$
<b>0.05 to 0.25 OUR ESTIMATE</b>				
0.083±0.005	ZHANG	13A	DPWA	Multichannel
0.07 ±0.03	GOPAL	80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
0.27 ±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 ±0.03	GOPAL	77	DPWA	See GOPAL 80

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Sigma\pi$	DOCUMENT ID	TECN	COMMENT	$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$
+0.04±0.01	ZHANG	13A	DPWA	Multichannel
+0.14±0.01	DEBELLEFON	77	DPWA	$K^-p \rightarrow \Sigma\pi$
+0.20±0.03	KANE	74	DPWA	$K^-p \rightarrow \Sigma\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
+0.10±0.03	GOPAL	77	DPWA	$\bar{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Lambda\omega$	DOCUMENT ID	TECN	COMMENT	$(\Gamma_1\Gamma_3)^{1/2}/\Gamma$
<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 $N\bar{K} \rightarrow \Lambda(2110) \rightarrow \Sigma(1385)\pi$ , <i>P-wave</i>	$(\Gamma_1 \Gamma_5)^{1/2} / \Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
+0.04 ± 0.01	ZHANG	13A	DPWA Multichannel
+0.071 ± 0.025	<sup>3</sup> CAMERON	78	DPWA $K^- p \rightarrow \Sigma(1385)\pi$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow N\bar{K}^*(892)$ , <i>S=1/2</i>	$(\Gamma_1 \Gamma_7)^{1/2} / \Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
-0.09 ± 0.01	ZHANG	13A	DPWA Multichannel
-0.17 ± 0.04	<sup>4</sup> CAMERON	78B	DPWA $K^- p \rightarrow N\bar{K}^*$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2110) \rightarrow N\bar{K}^*(892)$ , <i>S=3/2, P-wave</i>	$(\Gamma_1 \Gamma_8)^{1/2} / \Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
0.24 ± 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