

$\Lambda(2110) 5/2^+$ $I(J^P) = 0(\frac{5}{2}^+)$ 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>
2090 to 2140 (\approx 2110) OUR ESTIMATE			
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	¹ 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>
150 to 250 (\approx 200) OUR ESTIMATE			
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 ¹ NAKKASYAN 75 DPWA $K^- p \rightarrow \Lambda\omega$

$\Lambda(2110)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	5–25 %
Γ_2 $\Sigma\pi$	10–40 %
Γ_3 $\Lambda\omega$	seen
Γ_4 $\Sigma(1385)\pi$	seen
Γ_5 $\Sigma(1385)\pi$, <i>P</i> -wave	
Γ_6 $N\bar{K}^*(892)$	10–60 %
Γ_7 $N\bar{K}^*(892)$, $S=1/2$	
Γ_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 Λ and Σ Resonances.

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

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

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	¹ 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
$+0.071 \pm 0.025$	³ 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 ± 0.01	ZHANG	13A	DPWA Multichannel
-0.17 ± 0.04	⁴ 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 ± 0.01	ZHANG	13A	DPWA Multichannel

$\Lambda(2110)$ FOOTNOTES

- ¹ Found in one of two best solutions.
- ² The published error of 0.6 was a misprint.
- 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.
- 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.

$\Lambda(2110)$ 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