

# $\Lambda(2100) G_{07}$

$$I(J^P) = 0(\frac{7}{2}^-) \text{ Status: } ****$$

Discovered by COOL 66 and by WOHL 66. Most of the results published before 1973 are now obsolete and have been omitted. They may be found in our 1982 edition Physics Letters **111B** (1982).

This entry only includes results from partial-wave analyses. Parameters of peaks seen in cross sections and in invariant-mass distributions around 2100 MeV used to be listed in a separate entry immediately following. It may be found in our 1986 edition Physics Letters **170B** (1986).

## $\Lambda(2100)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2090 to 2110 (<math>\approx</math> 2100) OUR ESTIMATE</b>			
2104 $\pm$ 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
2106 $\pm$ 30	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
2110 $\pm$ 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
2105 $\pm$ 10	HEMINGWAY	75	DPWA $K^- p \rightarrow \bar{K}N$
2115 $\pm$ 10	KANE	74	DPWA $K^- p \rightarrow \Sigma\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2094	BACCARI	77	DPWA $K^- p \rightarrow \Lambda\omega$
2094	DECLAIS	77	DPWA $\bar{K}N \rightarrow \bar{K}N$
2110 or 2089	<sup>1</sup> NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

## $\Lambda(2100)$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>100 to 250 (<math>\approx</math> 200) OUR ESTIMATE</b>			
157 $\pm$ 40	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
250 $\pm$ 30	GOPAL	77	DPWA $\bar{K}N$ multichannel
241 $\pm$ 30	HEMINGWAY	75	DPWA $K^- p \rightarrow \bar{K}N$
152 $\pm$ 15	KANE	74	DPWA $K^- p \rightarrow \Sigma\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
98	BACCARI	77	DPWA $K^- p \rightarrow \Lambda\omega$
250	DECLAIS	77	DPWA $\bar{K}N \rightarrow \bar{K}N$
244 or 302	<sup>1</sup> NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

## $\Lambda(2100)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	25–35 %
$\Gamma_2$ $\Sigma\pi$	$\sim$ 5 %
$\Gamma_3$ $\Lambda\eta$	<3 %
$\Gamma_4$ $\Xi K$	<3 %

$\Gamma_5$	$\Lambda\omega$	< 8 %
$\Gamma_6$	$N\bar{K}^*(892)$	10–20 %
$\Gamma_7$	$N\bar{K}^*(892)$ , $S=1/2$ , $G$ -wave	
$\Gamma_8$	$N\bar{K}^*(892)$ , $S=3/2$ , $D$ -wave	

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

## $\Lambda(2100)$ 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>0.25 to 0.35 OUR ESTIMATE</b>			
0.34±0.03	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.24±0.06	DEBELLEFON	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.31±0.03	HEMINGWAY	75	DPWA $K^-p \rightarrow \bar{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.29	DECLAIS	77	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.30±0.03	GOPAL	77	DPWA See GOPAL 80

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.12±0.04	GOPAL	77	DPWA $\bar{K}N$ multichannel
+0.11±0.01	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Lambda\eta$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
−0.050±0.020	RADER	73	MPWA $K^-p \rightarrow \Lambda\eta$

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Xi K$ $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.035±0.018	LITCHFIELD	71	DPWA $K^-p \rightarrow \Xi K$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.003	MULLER	69B	DPWA $K^-p \rightarrow \Xi K$
0.05	TRIPP	67	RVUE $K^-p \rightarrow \Xi K$

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Lambda\omega$ $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
−0.070	<sup>2</sup> BACCARI	77	DPWA $GD_{37}$ wave
+0.011	<sup>2</sup> BACCARI	77	DPWA $GG_{17}$ wave
+0.008	<sup>2</sup> BACCARI	77	DPWA $GG_{37}$ wave
0.122 or 0.154	<sup>1</sup> NAKKASYAN	75	DPWA $K^-p \rightarrow \Lambda\omega$

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}^*(892)$ , $S=3/2$ , $D$ -wave $(\Gamma_1\Gamma_8)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.21±0.04	CAMERON	78B	DPWA $K^-p \rightarrow N\bar{K}^*$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}^*(892), S=1/2, G\text{-wave } (\Gamma_1 \Gamma_7)^{1/2} / \Gamma$	DOCUMENT ID	TECN	COMMENT
-0.04 ± 0.03	<sup>3</sup> CAMERON	78B DPWA	$K^- p \rightarrow N\bar{K}^*$

### $\Lambda(2100)$ FOOTNOTES

- <sup>1</sup> The NAKKASYAN 75 values are from the two best solutions found. Each has the  $\Lambda(2100)$  and one additional resonance ( $P_3$  or  $F_5$ ).
- <sup>2</sup> Note that the three for BACCARI 77 entries are for three different waves.
- <sup>3</sup> The published sign has been changed to be in accord with the baryon-first convention. The upper limit on the  $G_3$  wave is 0.03.

### $\Lambda(2100)$ REFERENCES

PDG	86	PL 170B	M. Aguilar-Benitez <i>et al.</i>	(CERN, CIT+)
PDG	82	PL 111B	M. Roos <i>et al.</i>	(HELSE, CIT, CERN)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) 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
DECLAIS	77	CERN 77-16	Y. Declais <i>et al.</i>	(CAEN, CERN) IJP
GOPAL	77	NP B119 362	G.P. Gopal <i>et al.</i>	(LOIC, RHEL) IJP
HEMINGWAY	75	NP B91 12	R.J. Hemingway <i>et al.</i>	(CERN, HEIDH, MPIM) IJP
NAKKASYAN	75	NP B93 85	A. Nakkasyan	(CERN) IJP
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
RADER	73	NC 16A 178	R.K. Rader <i>et al.</i>	(SACL, HEID, CERN+)
LITCHFIELD	71	NP B30 125	P.J. Litchfield <i>et al.</i>	(RHEL, CDEF, SACL) IJP
MULLER	69B	Thesis UCRL 19372	R.A. Muller	(LRL)
TRIPP	67	NP B3 10	R.D. Tripp <i>et al.</i>	(LRL, SLAC, CERN+)
COOL	66	PRL 16 1228	R.L. Cool <i>et al.</i>	(BNL)
WOHL	66	PRL 17 107	C.G. Wohl, F.T. Solmitz, M.L. Stevenson	(LRL) IJP