

$\Lambda(2100) 7/2^-$ $I(J^P) = 0(\frac{7}{2}^-)$ Status: * * * *

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** 1 (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** 1 (1986).

$\Lambda(2100)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2040 ± 14	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2023	ZHANG	13A DPWA	Multichannel

− 2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
215 ± 29	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
239	ZHANG	13A DPWA	Multichannel

$\Lambda(2100)$ POLE RESIDUE

The “normalized residue” is the residue divided by $\Gamma_{pole}/2$.

Normalized residue in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.28 ± 0.06	− 40 ± 10	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.09 ± 0.02	− 35 ± 15	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Sigma(1385)\pi$, D-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.04 ± 0.03		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow \Sigma(1385)\pi$, G-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.06 ± 0.03	− 45 ± 15	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}^*(892)$, S=3/2, D-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.11 ± 0.06	− 30 ± 30	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

$\Lambda(2100)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2090 to 2110 (≈ 2100) OUR ESTIMATE			
2090 \pm 15	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
2086 \pm 6	ZHANG 13A	DPWA	Multichannel
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	¹ NAKKASYAN 75	DPWA	$K^- p \rightarrow \Lambda \omega$

 $\Lambda(2100)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
100 to 250 (≈ 200) OUR ESTIMATE			
290 \pm 30	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
305 \pm 16	ZHANG 13A	DPWA	Multichannel
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	¹ NAKKASYAN 75	DPWA	$K^- p \rightarrow \Lambda \omega$

 $\Lambda(2100)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	25–35 %
Γ_2 $\Sigma \pi$	~ 5 %
Γ_3 $\Lambda \eta$	< 3 %
Γ_4 ΞK	< 3 %
Γ_5 $\Lambda \omega$	< 8 %
Γ_6 $N\bar{K}^*(892)$	10–20 %
Γ_7 $\Sigma(1385)\pi$, D -wave	
Γ_8 $\Sigma(1385)\pi$, G -wave	(1.0 \pm 1.0) %
Γ_9 $N\bar{K}^*(892)$, $S=3/2$, D -wave	(4.0 \pm 2.0) %
Γ_{10} $N\bar{K}^*(892)$, $S=1/2$, G -wave	
Γ_{11} $N\bar{K}^*(892)$, $S=3/2$, G -wave	

$\Lambda(2100)$ BRANCHING RATIOSSee “Sign conventions for resonance couplings” in the Note on Λ and Σ Resonances. **$\Gamma(N\bar{K})/\Gamma_{\text{total}}$ Γ_1/Γ**

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.25 to 0.35 (≈ 0.30) OUR ESTIMATE			
0.24 \pm 0.05	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
0.23 \pm 0.01	ZHANG 13A	DPWA	Multichannel
0.34 \pm 0.03	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
0.24 \pm 0.06	DEBELLEFON 78	DPWA	$\bar{K}N \rightarrow \bar{K}N$
0.31 \pm 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 \pm 0.03	GOPAL 77	DPWA	See GOPAL 80

 $\Gamma(\Sigma\pi)/\Gamma_{\text{total}}$ Γ_2/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.030\pm0.015	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_7/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.01	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $\Gamma(\Sigma(1385)\pi, G\text{-wave})/\Gamma_{\text{total}}$ Γ_8/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.01\pm0.01	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $\Gamma(N\bar{K}^*(892), S=3/2, D\text{-wave})/\Gamma_{\text{total}}$ Γ_9/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.04\pm0.02	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ 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>
+0.03 \pm 0.01	ZHANG 13A	DPWA	Multichannel
+0.12 \pm 0.04	GOPAL 77	DPWA	$\bar{K}N$ multichannel
+0.11 \pm 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 \pm 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 \pm 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	$K^- p \rightarrow \Xi K$

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

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

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}^*(892), S=3/2, D\text{-wave } (\Gamma_1 \Gamma_9)^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
+0.16 ± 0.02	ZHANG 13A	DPWA	Multichannel
+0.21 ± 0.04	CAMERON 78B	DPWA	$K^- p \rightarrow N\bar{K}^*$

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}^*(892), S=1/2, G\text{-wave } (\Gamma_1 \Gamma_{10})^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
-0.03 ± 0.02	ZHANG 13A	DPWA	Multichannel
-0.04 ± 0.03	³ CAMERON 78B	DPWA	$K^- p \rightarrow N\bar{K}^*$

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(2100) \rightarrow N\bar{K}^*(892), S=3/2, G\text{-wave } (\Gamma_1 \Gamma_{11})^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
+0.08 ± 0.02	ZHANG 13A	DPWA	Multichannel

$\Lambda(2100)$ FOOTNOTES

- ¹ 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).
- ² Note that the three for BACCARI 77 entries are for three different waves.
- ³ 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

SARANTSEV 19	EPJ A55 180	A.V. Sarantsev <i>et al.</i>	(BONN, PNPI)
ZHANG 13A	PR C88 035205	H. Zhang <i>et al.</i>	(KSU)
PDG 86	PL 170B 1	M. Aguilar-Benitez <i>et al.</i>	(CERN, CIT+)
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 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+)