$\Lambda(2100)$ $7/2^-$

$I(J^P) = 0(\frac{7}{2}^-)$ 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	$\overline{K}N$ 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	$\overline{K}N$ 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 $N\overline{K} \to \Lambda(2100) \to N\overline{K}$

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

Normalized residue in $N\overline{K} \to \Lambda(2100) \to \Sigma\pi$

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

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

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

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

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

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

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

Λ(2100) MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2090 to 2110 (≈ 2100) OUR ESTIMATE				
2090±15	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
2086± 6	ZHANG	13A	DPWA	Multichannel
2104±10	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
2106±30	DEBELLEFON	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
2110±10	GOPAL	77	DPWA	$\overline{K}N$ multichannel
2105±10	HEMINGWAY	75	DPWA	$K^- p \rightarrow \overline{K}N$
2115±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	$\overline{K}N \rightarrow \overline{K}N$
2110 or 2089	[1] NAKKASYAN	75	DPWA	$K^- p \rightarrow \Lambda\omega$

Λ(2100) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
100 to 250 (≈ 200) OUR ESTIMATE				
290±30	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
305±16	ZHANG	13A	DPWA	Multichannel
157±40	DEBELLEFON	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
250±30	GOPAL	77	DPWA	$\overline{K}N$ multichannel
241±30	HEMINGWAY	75	DPWA	$K^- p \rightarrow \overline{K}N$
152±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	$\overline{K}N \rightarrow \overline{K}N$
244 or 302	[1] NAKKASYAN	75	DPWA	$K^- p \rightarrow \Lambda\omega$

Λ(2100) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	25–35 %
Γ_2	$\Sigma\pi$	$\sim$ 5 %
Γ_3	$\Lambda\eta$	<3 %
Γ_4	ΞK	<3 %
Γ_5	$\Lambda\omega$	<8 %

Γ_6	$\Sigma(1385)\pi$, D-wave	
Γ_7	$\Sigma(1385)\pi$, G-wave	(1.0 ± 1.0) %
Γ_8	$N\overline{K}^*(892)$	10–20 %
Γ_9	$N\overline{K}^*(892)$, S=3/2, D-wave	(4.0 ± 2.0) %
Γ_{10}	$N\overline{K}^*(892)$, S=1/2, G-wave	
Γ_{11}	$N\overline{K}^*(892)$, S=3/2, G-wave	

Λ(2100) BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

$\Gamma(N\overline{K})/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.25 to 0.35 (≈ 0.30) OUR ESTIMATE				
0.24 ± 0.05	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.23 ± 0.01	ZHANG	13A	DPWA	Multichannel
0.34 ± 0.03	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.24 ± 0.06	DEBELLEFON	78	DPWA	$\overline{K}N \to \overline{K}N$
0.31 ± 0.03	HEMINGWAY	75	DPWA	$K^-p \to \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.29	DECLAIS	77	DPWA	$\overline{K}N \to \overline{K}N$
0.30 ± 0.03	GOPAL	77	DPWA	See GOPAL 80

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.030 ± 0.015	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{total}$ — Γ_6/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
<0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.01 ± 0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.04 ± 0.02	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to \Sigma\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.03\pm0.01$	ZHANG	13A	DPWA	Multichannel
$+0.12\pm0.04$	GOPAL	77	DPWA	$\overline{K}N$ multichannel
$+0.11\pm0.01$	KANE	74	DPWA	$K^-p \to \Sigma\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to \Lambda\eta$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.050 ± 0.020	RADER	73	MPWA	$K^-p \to \Lambda\eta$

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to \Xi K$ — $(\Gamma_1\Gamma_4)^{½}/\Gamma$

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

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to \Lambda\omega$ — $(\Gamma_1\Gamma_5)^{½}/\Gamma$

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	$K^- p \to \Lambda\omega$

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to N\overline{K}^*(892)$, S=3/2, D-wave — $(\Gamma_1\Gamma_9)^{½}/\Gamma$

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

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to N\overline{K}^*(892)$, S=1/2, G-wave — $(\Gamma_1\Gamma_{10})^{½}/\Gamma$

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

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2100) \to N\overline{K}^*(892)$, S=3/2, G-wave — $(\Gamma_1\Gamma_{11})^{½}/\Gamma$

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

Λ(2100) FOOTNOTES

[1] The NAKKASYAN 75 values are from the two best solutions found. Each has the Λ(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.

Λ(2100) REFERENCES

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)
PDG	86	PL 170B 1	M. Aguilar-Benitez *et al.*	(CERN, CIT+)
PDG	82	PL 111B 1	M. Roos *et al.*	(HELS, CIT, CERN)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
CAMERON	78B	NP B146 327	W. Cameron *et al.*	(RHEL, LOIC) IJP
DEBELLEFON	78	NC 42A 403	A. de Bellefon *et al.*	(CDEF, SACL) IJP
BACCARI	77	NC 41A 96	B. Baccari *et al.*	(SACL, CDEF) IJP
DECLAIS	77	CERN 77-16	Y. Declais *et al.*	(CAEN, CERN) IJP

GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(LOIC, RHEL)	IJP
HEMINGWAY	75	NP B91 12	R.J. Hemingway *et al.*	(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 *et al.*	(SACL, HEID, CERN+)	
LITCHFIELD	71	NP B30 125	P.J. Litchfield *et al.*	(RHEL, CDEF, SACL)	IJP
MULLER	69B	Thesis UCRL 19372	R.A. Muller	(LRL)	
TRIPP	67	NP B3 10	R.D. Tripp *et al.*	(LRL, SLAC, CERN+)	