

$\Lambda(1890) \ 3/2^+$ $I(J^P) = 0(\frac{3}{2}^+)$ Status: ****

For results published before 1974 (they are now obsolete), see our 1982 edition Physics Letters **111B** 1 (1982).

 $\Lambda(1890)$ POLE POSITION**REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1872±5	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1859 ⁺⁵ ₋₇	¹ KAMANO 15	DPWA	Multichannel
1876	ZHANG 13A	DPWA	Multichannel
¹ From the preferred solution A in KAMANO 15, incompatible with solution B.			

−2×IMAGINARY PART

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
101±10	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
113 ⁺²⁰ ₋₄	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
145	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15, incompatible with solution B.			

 $\Lambda(1890)$ POLE RESIDUE

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

Normalized residue in $\bar{K}N \rightarrow \Lambda(1890) \rightarrow \bar{K}N$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.30 ±0.06	0 ± 10	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.241	−23	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma\pi$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.14 ±0.05	148 ± 12	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.101	104	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Lambda\eta$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.0485	−54	¹ KAMANO 15	DPWA	Multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Xi K$

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.065 \pm 0.020	160 \pm 30	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0562	-85	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
--------	-----	------------------------	------	-------------------------

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi$, P -wave

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.11 \pm 0.05	-160 \pm 45	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.295	-40	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
-------	-----	------------------------	------	-------------------------

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi$, F -wave

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.10 \pm 0.04	10 \pm 50	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.064	127	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
-------	-----	------------------------	------	-------------------------

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow N\bar{K}^*(892)$, $S=1/2$, P -wave

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.03 \pm 0.03		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.188	-160	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
-------	------	------------------------	------	-------------------------

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow N\bar{K}^*(892)$, $S=3/2$, P -wave

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.05 \pm 0.03	180 \pm 40	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.209	15	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel
-------	----	------------------------	------	-------------------------

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow N\bar{K}^*(892)$, $S=3/2$, F -wave

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.0141	129	¹ KAMANO 15	DPWA	Multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Lambda\omega$, $S=1/2$, P -wave

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.24 \pm 0.06	15 \pm 20	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Lambda\omega$, $S=3/2$, P -wave

<u>MODULUS</u>	<u>PHASE ($^\circ$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.15±0.08	-165 ± 20	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $\Lambda(1890)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1870 to 1910 (≈ 1890) OUR ESTIMATE			
1873± 5	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
1900± 5	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
1897± 5	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
1908±10	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1894±10	HEMINGWAY 75	DPWA	$K^- p \rightarrow \bar{K}N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1900± 5	GOPAL 77	DPWA	$\bar{K}N$ multichannel
1856 or 1868	¹ MARTIN 77	DPWA	$\bar{K}N$ multichannel
1900	² NAKKASYAN 75	DPWA	$K^- p \rightarrow \Lambda\omega$

¹ The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.² Found in one of two best solutions. **$\Lambda(1890)$ WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
80 to 160 (≈ 120) OUR ESTIMATE			
103±10	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
161±15	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
74±10	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
119±20	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
107±10	HEMINGWAY 75	DPWA	$K^- p \rightarrow \bar{K}N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
72±10	GOPAL 77	DPWA	$\bar{K}N$ multichannel
191 or 193	¹ MARTIN 77	DPWA	$\bar{K}N$ multichannel
100	² NAKKASYAN 75	DPWA	$K^- p \rightarrow \Lambda\omega$

¹ The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.² Found in one of two best solutions. **$\Lambda(1890)$ DECAY MODES**

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	0.24 to 0.36
Γ_2 $\Sigma\pi$	3–10 %
Γ_3 $\Lambda\eta$	
Γ_4 ΞK	
Γ_5 $\Sigma(1385)\pi$	seen
Γ_6 $\Sigma(1385)\pi$, P -wave	(6.0 ± 3.0) %
Γ_7 $\Sigma(1385)\pi$, F -wave	(4.0 ± 2.0) %
Γ_8 $N\bar{K}^*(892)$	seen

Γ_9	$N\bar{K}^*(892)$, $S=1/2$
Γ_{10}	$N\bar{K}^*(892)$, $S=1/2$, P -wave
Γ_{11}	$N\bar{K}^*(892)$, $S=3/2$, P -wave
Γ_{12}	$N\bar{K}^*(892)$, $S=3/2$, F -wave
Γ_{13}	$\Lambda\omega$

$\Lambda(1890)$ 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
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.24 to 0.36 OUR ESTIMATE				
0.30 \pm 0.06	SARANTSEV	19	DPWA $\bar{K}N$ multichannel	
0.37 \pm 0.03	ZHANG	13A	DPWA $\bar{K}N$ multichannel	
0.20 \pm 0.02	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$	
0.34 \pm 0.05	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$	
0.24 \pm 0.04	HEMINGWAY	75	DPWA $K^-p \rightarrow \bar{K}N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.305	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel	
0.18 \pm 0.02	GOPAL	77	DPWA See GOPAL 80	
0.36 or 0.34	² MARTIN	77	DPWA $\bar{K}N$ multichannel	

¹ From the preferred solution A in KAMANO 15.

² The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

$\Gamma(\Sigma\pi)/\Gamma_{\text{total}}$				Γ_2/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
6 \pm 2	SARANTSEV	19	DPWA $\bar{K}N$ multichannel	
<0.03	LANGBEIN	72	IPWA $\bar{K}N$ multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.04	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel	

¹ From the preferred solution A in KAMANO 15.

$\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$				Γ_3/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.012	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel	

¹ From the preferred solution A in KAMANO 15.

$\Gamma(\Xi K)/\Gamma_{\text{total}}$				Γ_4/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
\sim 0.01	SARANTSEV	19	DPWA $\bar{K}N$ multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.009	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel	

¹ From the preferred solution A in KAMANO 15.

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.06 ± 0.03	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.453	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(\Sigma(1385)\pi, F\text{-wave})/\Gamma_{\text{total}}$ Γ_7/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.04 ± 0.02	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.019	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=1/2, P\text{-wave})/\Gamma_{\text{total}}$ Γ_{10}/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.01	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.073	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=3/2, P\text{-wave})/\Gamma_{\text{total}}$ Γ_{11}/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
~ 0.01	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.088	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=3/2, F\text{-wave})/\Gamma_{\text{total}}$ Γ_{12}/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.001	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-0.09 ± 0.02	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
-0.09 ± 0.03	GOPAL 77	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
+0.15 or +0.14	¹ MARTIN 77	DPWA	$\bar{K}N$ multichannel

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi, P\text{-wave}$ $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.03	CAMERON 78	DPWA	$K^-p \rightarrow \Sigma(1385)\pi$

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi, F\text{-wave} \quad (\Gamma_1 \Gamma_7)^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
-0.31 ± 0.04	ZHANG	13A	DPWA $\bar{K}N$ multichannel
-0.126 ± 0.055	¹ CAMERON	78	DPWA $K^- p \rightarrow \Sigma(1385)\pi$

¹ The published sign has been changed to be in accord with the baryon-first convention.

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(1890) \rightarrow N\bar{K}^*(892), S=1/2 \quad (\Gamma_1 \Gamma_9)^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
-0.17 ± 0.05	ZHANG	13A	DPWA $\bar{K}N$ multichannel
-0.07 ± 0.03	^{1,2} CAMERON	78B	DPWA $K^- p \rightarrow N\bar{K}^*$

¹ Upper limits on the P_3 and F_3 waves are each 0.03.

² The published sign has been changed to be in accord with the baryon-first convention.

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(1890) \rightarrow N\bar{K}^*(892), S=3/2, F\text{-wave} \quad (\Gamma_1 \Gamma_{12})^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
-0.11 ± 0.03	ZHANG	13A	DPWA $\bar{K}N$ multichannel

$$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Lambda\omega \quad (\Gamma_1 \Gamma_{13})^{1/2} / \Gamma$$

VALUE	DOCUMENT ID	TECN	COMMENT
seen	BACCARI	77	IPWA $K^- p \rightarrow \Lambda\omega$
0.032	¹ NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

¹ Found in one of two best solutions.

$\Lambda(1890)$ REFERENCES

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev <i>et al.</i>	(BONN, PNPI)
KAMANO	15	PR C92 025205	H. Kamano <i>et al.</i>	(ANL, OSAK)
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
ALSTON-...	78	PR D18 182	M. Alston-Garnjost <i>et al.</i>	(LBL, MTHO+) IJP
Also		PRL 38 1007	M. Alston-Garnjost <i>et al.</i>	(LBL, MTHO+) 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
BACCARI	77	NC 41A 96	B. Baccari <i>et al.</i>	(SACL, CDEF) IJP
GOPAL	77	NP B119 362	G.P. Gopal <i>et al.</i>	(LOIC, RHEL) IJP
MARTIN	77	NP B127 349	B.R. Martin, M.K. Pidcock, R.G. Moorhouse	(LOUC+) IJP
Also		NP B126 266	B.R. Martin, M.K. Pidcock	(LOUC)
Also		NP B126 285	B.R. Martin, M.K. Pidcock	(LOUC) 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
LANGBEIN	72	NP B47 477	W. Langbein, F. Wagner	(MPIM) IJP