

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

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

The $J^P = 3/2^+$ assignment is consistent with all available data (including polarization) and recent partial-wave analyses. The dominant inelastic modes remain unknown.

$\Lambda(1890)$ 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. ● ● ●			
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>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
113^{+20}_{-4}	¹ KAMANO	15	DPWA Multichannel
145	ZHANG	13A	DPWA Multichannel
¹ From the preferred solution A in KAMANO 15, incompatible with solution B.			

$\Lambda(1890)$ INELASTIC POLE RESIDUE

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

Normalized residue in $KN \rightarrow \Lambda(1890) \rightarrow KN$

<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. ● ● ●				
0.241	–23	¹ KAMANO	15	DPWA 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>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.101	104	¹ KAMANO	15	DPWA 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>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0562	-85	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.295	-40	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.064	127	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.188	-160	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.209	15	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0141	129	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

 $\Lambda(1890)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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1850 to 1910 (≈ 1890) OUR ESTIMATE

1900 \pm 5	ZHANG	13A	DPWA Multichannel
1897 \pm 5	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1908 \pm 10	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1900 \pm 5	GOPAL	77	DPWA $\bar{K}N$ multichannel
1894 \pm 10	HEMINGWAY	75	DPWA $K^- p \rightarrow \bar{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1856 or 1868	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
1900	² NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

²Found in one of two best solutions.

$\Lambda(1890)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
60 to 200 (≈ 100) OUR ESTIMATE			
161 \pm 15	ZHANG	13A	DPWA Multichannel
74 \pm 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
119 \pm 20	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
72 \pm 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
107 \pm 10	HEMINGWAY	75	DPWA $K^- p \rightarrow \bar{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
191 or 193	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
100	² NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

²Found in one of two best solutions.

$\Lambda(1890)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	20–35 %
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	
Γ_7 $\Sigma(1385)\pi$, F -wave	
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
VALUE	DOCUMENT ID	TECN	COMMENT	
0.20 to 0.35 OUR ESTIMATE				
0.37 \pm 0.03	ZHANG	13A	DPWA 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	Multichannel
0.18 ± 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>
<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	Multichannel
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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>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.012	¹ KAMANO	15	DPWA	Multichannel
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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>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.009	¹ KAMANO	15	DPWA	Multichannel
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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>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.453	¹ KAMANO	15	DPWA	Multichannel
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¹ From 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>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.019	¹ KAMANO	15	DPWA	Multichannel
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¹ From 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>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.073	¹ KAMANO	15	DPWA	Multichannel
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¹ From the preferred solution A in KAMANO 15.

$\Gamma(N\bar{K}^*(892), S=3/2, P\text{-wave})/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.088	¹ KAMANO	15	DPWA Multichannel
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¹ From the preferred solution A in KAMANO 15.

$\Gamma(N\bar{K}^*(892), S=3/2, F\text{-wave})/\Gamma_{\text{total}}$ Γ_{12}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.001	¹ KAMANO	15	DPWA Multichannel
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¹ From the preferred solution A in KAMANO 15.

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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−0.09±0.02	ZHANG	13A	DPWA Multichannel
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−0.09±0.03	GOPAL	77	DPWA $\bar{K}N$ multichannel
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• • • 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
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¹ The 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 $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi, P\text{-wave}$ $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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<0.03	CAMERON	78	DPWA $K^-p \rightarrow \Sigma(1385)\pi$
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$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi, F\text{-wave}$ $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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−0.31 ±0.04	ZHANG	13A	DPWA Multichannel
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−0.126±0.055	¹ CAMERON	78	DPWA $K^-p \rightarrow \Sigma(1385)\pi$
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¹ The published sign has been changed to be in accord with the baryon-first convention.

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

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

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

VALUE	DOCUMENT ID	TECN	COMMENT
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−0.11±0.03	ZHANG	13A	DPWA Multichannel
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$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Lambda\omega$				$(\Gamma_1 \Gamma_{13})^{1/2} / \Gamma$
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

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>	(HELSE, 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