$\Lambda(1890)$ $3/2^+$

$I(J^P) = 0(\frac{3}{2}^+)$ 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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1872±5	SARANTSEV	19	DPWA	$\overline{K}N$ 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

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
101±10	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$113^{+20}_{-\ 4}$	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
145	ZHANG	13A	DPWA	$\overline{K}N$ 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 $K N \to \Lambda(1890) \to K N$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.30 ±0.06	**0 ± 10**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.241	−23	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Lambda(1890) \to \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.14 ±0.05	**148 ± 12**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.101	104	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Lambda(1890) \to \Lambda\eta$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • 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 $N\overline{K} \rightarrow \Lambda(1890) \rightarrow \Xi K$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.065 ±0.020	**160 ± 30**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0562	−85	[1] KAMANO 15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.11 ±0.05	**−160 ± 45**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.295	−40	[1] KAMANO 15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.10 ±0.04	**10 ± 50**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.064	127	[1] KAMANO 15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.03 ±0.03		SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.188	−160	[1] KAMANO 15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.05 ±0.03	**180 ± 40**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.209	15	[1] KAMANO 15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0141	129	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.24±0.06	**15 ± 20**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.15±0.08	**−165 ± 20**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Λ(1890) MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1870 to 1910 (≈ 1890) OUR ESTIMATE			
1897.2± 9.6±6.2	ABLIKIM 25AF	BES3	$\psi(3686) \rightarrow \Lambda\overline{\Sigma}^0\pi^0$+ c.c. (PWA)
1873 ± 5	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
1900 ± 5	ZHANG 13A	DPWA	$\overline{K}N$ multichannel
1897 ± 5	GOPAL 80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1908 ±10	ALSTON-... 78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1894 ±10	HEMINGWAY 75	DPWA	$K^- p \rightarrow \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1900 ± 5	GOPAL 77	DPWA	$\overline{K}N$ multichannel
1856 or 1868	[1] MARTIN 77	DPWA	$\overline{K}N$ 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.

Λ(1890) WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
80 to 160 (≈ 120) OUR ESTIMATE			
149.2±13.5±4.1	ABLIKIM 25AF	BES3	$\psi(3686) \rightarrow \Lambda\overline{\Sigma}^0\pi^0$+ c.c. (PWA)
103 ±10	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
161 ±15	ZHANG 13A	DPWA	$\overline{K}N$ multichannel
74 ±10	GOPAL 80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
119 ±20	ALSTON-... 78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
107 ±10	HEMINGWAY 75	DPWA	$K^- p \rightarrow \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
72 ±10	GOPAL 77	DPWA	$\overline{K}N$ multichannel
191 or 193	[1] MARTIN 77	DPWA	$\overline{K}N$ 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.

Λ(1890) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	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	$N\overline{K}^*(892)$	seen
Γ_9	$N\overline{K}^*(892)$, S=1/2	
Γ_{10}	$N\overline{K}^*(892)$, S=1/2, P-wave	
Γ_{11}	$N\overline{K}^*(892)$, S=3/2, P-wave	
Γ_{12}	$N\overline{K}^*(892)$, S=3/2, F-wave	
Γ_{13}	$\Lambda\omega$	

Λ(1890) 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
0.24 to 0.36 OUR ESTIMATE				
0.30 ±0.06	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.37 ±0.03	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
0.20 ±0.02	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.34 ±0.05	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
0.24 ±0.04	HEMINGWAY	75	DPWA	$K^- p \to \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.305	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
0.18 ±0.02	GOPAL	77	DPWA	See GOPAL 80
0.36 or 0.34	[2] MARTIN	77	DPWA	$\overline{K}N$ 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.

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

VALUE	DOCUMENT ID		TECN	COMMENT
6 ±2	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
<0.03	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.04	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

$\Gamma(\Lambda\eta)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.012	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

$\Gamma(\Xi K)/\Gamma_{total}$ — Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
∼ 0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.009	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

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

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

[1] From the preferred solution A in KAMANO 15.

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

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

[1] From the preferred solution A in KAMANO 15.

$\Gamma(N\overline{K}^*(892), S=1/2, P\text{-wave})/\Gamma_{total}$ — Γ_{10}/Γ

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

[1] From the preferred solution A in KAMANO 15.

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

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

[1] From the preferred solution A in KAMANO 15.

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

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

[1] From the preferred solution A in KAMANO 15.

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

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

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1890) \to \Sigma(1385)\pi$, P-wave — $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.31\ \pm0.04$	ZHANG	13A	DPWA	$\overline{K}N$ 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.

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

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

[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.

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

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

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

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.

Λ(1890) REFERENCES

ABLIKIM	25AF	JHEP 2502 212	M. Ablikim *et al.*	(BESIII Collab.)	
SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)	
KAMANO	15	PR C92 025205	H. Kamano *et al.*	(ANL, OSAK)	
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)	
PDG	82	PL 111B 1	M. Roos *et al.*	(HELS, CIT, CERN)	
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL)	IJP
ALSTON-...	78	PR D18 182	M. Alston-Garnjost *et al.*	(LBL, MTHO+)	IJP
Also		PRL 38 1007	M. Alston-Garnjost *et al.*	(LBL, MTHO+)	IJP
CAMERON	78	NP B143 189	W. Cameron *et al.*	(RHEL, LOIC)	IJP
CAMERON	78B	NP B146 327	W. Cameron *et al.*	(RHEL, LOIC)	IJP
BACCARI	77	NC 41A 96	B. Baccari *et al.*	(SACL, CDEF)	IJP
GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(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 *et al.*	(CERN, HEIDH, MPIM)	IJP
NAKKASYAN	75	NP B93 85	A. Nakkasyan	(CERN)	IJP
LANGBEIN	72	NP B47 477	W. Langbein, F. Wagner	(MPIM)	IJP