

$\Lambda(1890) \ 3/2^+$  $I(J^P) = 0(\frac{3}{2}^+)$  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>
<b>1872±5</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
●●● We do not use the following data for averages, fits, limits, etc. ●●●			
1859 <sup>+5</sup> <sub>-7</sub>	<sup>1</sup> KAMANO 15	DPWA	Multichannel
1876	ZHANG 13A	DPWA	Multichannel
<sup>1</sup> 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>
<b>101±10</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
●●● We do not use the following data for averages, fits, limits, etc. ●●●			
113 <sup>+20</sup> <sub>-4</sub>	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel
145	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
<sup>1</sup> 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>
<b>0.30 ±0.06</b>	<b>0 ± 10</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
●●● We do not use the following data for averages, fits, limits, etc. ●●●				
0.241	−23	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel
<sup>1</sup> 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>
<b>0.14 ±0.05</b>	<b>148 ± 12</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
●●● We do not use the following data for averages, fits, limits, etc. ●●●				
0.101	104	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel
<sup>1</sup> 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	<sup>1</sup> KAMANO 15	DPWA	Multichannel
<sup>1</sup> 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.065 ± 0.020</b>	<b>160 ± 30</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • •				We do not use the following data for averages, fits, limits, etc. • • •
0.0562	−85	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.11 ± 0.05</b>	<b>−160 ± 45</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • •				We do not use the following data for averages, fits, limits, etc. • • •
0.295	−40	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.10 ± 0.04</b>	<b>10 ± 50</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • •				We do not use the following data for averages, fits, limits, etc. • • •
0.064	127	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.03 ± 0.03</b>		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • •				We do not use the following data for averages, fits, limits, etc. • • •
0.188	−160	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.05 ± 0.03</b>	<b>180 ± 40</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • •				We do not use the following data for averages, fits, limits, etc. • • •
0.209	15	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • •				We do not use the following data for averages, fits, limits, etc. • • •
0.0141	129	<sup>1</sup> KAMANO 15	DPWA	Multichannel

<sup>1</sup>From 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 (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.24 ± 0.06</b>	<b>15 ± 20</b>	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 (<math>^\circ</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.15±0.08</b>	<b>-165 ± 20</b>	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

### $\Lambda(1890)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1870 to 1910 (<math>\approx</math> 1890) OUR ESTIMATE</b>			
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	<sup>1</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel
1900	<sup>2</sup> NAKKASYAN 75	DPWA	$K^- p \rightarrow \Lambda\omega$

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

<sup>2</sup> Found in one of two best solutions.

### $\Lambda(1890)$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>80 to 160 (<math>\approx</math> 120) OUR ESTIMATE</b>			
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	<sup>1</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel
100	<sup>2</sup> NAKKASYAN 75	DPWA	$K^- p \rightarrow \Lambda\omega$

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

<sup>2</sup> Found in one of two best solutions.

### $\Lambda(1890)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	0.24 to 0.36
$\Gamma_2$ $\Sigma\pi$	3–10 %
$\Gamma_3$ $\Lambda\eta$	
$\Gamma_4$ $\Xi K$	
$\Gamma_5$ $\Sigma(1385)\pi$	seen
$\Gamma_6$ $\Sigma(1385)\pi$ , $P$ -wave	(6.0 ± 3.0) %

$\Gamma_7$	$\Sigma(1385)\pi$ , F-wave	(4.0 $\pm$ 2.0) %
$\Gamma_8$	$N\bar{K}^*(892)$	seen
$\Gamma_9$	$N\bar{K}^*(892)$ , S=1/2	
$\Gamma_{10}$	$N\bar{K}^*(892)$ , S=1/2, P-wave	
$\Gamma_{11}$	$N\bar{K}^*(892)$ , S=3/2, P-wave	
$\Gamma_{12}$	$N\bar{K}^*(892)$ , S=3/2, F-wave	
$\Gamma_{13}$	$\Lambda\omega$	

## $\Lambda(1890)$ BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on  $\Lambda$  and  $\Sigma$  Resonances.

### $\Gamma(N\bar{K})/\Gamma_{\text{total}}$ $\Gamma_1/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.24 to 0.36 OUR ESTIMATE</b>			
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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel
0.18 $\pm$ 0.02	GOPAL 77	DPWA	See GOPAL 80
0.36 or 0.34	<sup>2</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

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

### $\Gamma(\Sigma\pi)/\Gamma_{\text{total}}$ $\Gamma_2/\Gamma$

<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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

### $\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$ $\Gamma_3/\Gamma$

<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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

### $\Gamma(\Xi K)/\Gamma_{\text{total}}$ $\Gamma_4/\Gamma$

<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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

$\Gamma(\Sigma(1385)\pi, P\text{-wave})/\Gamma_{\text{total}} \qquad \Gamma_6/\Gamma$

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

<sup>1</sup>From the preferred solution A in KAMANO 15.

$\Gamma(\Sigma(1385)\pi, F\text{-wave})/\Gamma_{\text{total}} \qquad \Gamma_7/\Gamma$

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

<sup>1</sup>From the preferred solution A in KAMANO 15.

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

<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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

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

<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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

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

<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	<sup>1</sup> KAMANO 15	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>From the preferred solution A in KAMANO 15.

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

<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	<sup>1</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel

<sup>1</sup>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  $N\bar{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(1385)\pi, P\text{-wave} \qquad (\Gamma_1\Gamma_6)^{1/2}/\Gamma$

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

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

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

<sup>1</sup> 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
-0.17 ± 0.05	ZHANG	13A	DPWA $\bar{K}N$ multichannel
-0.07 ± 0.03	<sup>1,2</sup> CAMERON	78B	DPWA $K^- p \rightarrow N\bar{K}^*$

<sup>1</sup> Upper limits on the  $P_3$  and  $F_3$  waves are each 0.03.

<sup>2</sup> 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-wave*  $(\Gamma_1 \Gamma_{12})^{1/2} / \Gamma$

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

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$  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	<sup>1</sup> NAKKASYAN	75	DPWA $K^- p \rightarrow \Lambda\omega$

<sup>1</sup> 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