

$\Lambda(1690) \ 3/2^-$ $I(J^P) = 0(\frac{3}{2}^-)$ Status: ****

The measurements of the mass, width, and elasticity published before 1974 are now obsolete and have been omitted. They were last listed in our 1982 edition Physics Letters **111B** 1 (1982).

$\Lambda(1690)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1680 to 1700 (≈ 1690) OUR ESTIMATE			
1683 ± 3	SARANTSEV	19	DPWA $\bar{K}N$ multichannel
1697^{+6}_{-6}	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1689	ZHANG	13A	DPWA $\bar{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.			

–2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
60 to 80 (≈ 70) OUR ESTIMATE			
72 ± 5	SARANTSEV	19	DPWA $\bar{K}N$ multichannel
65 ± 14	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
53	ZHANG	13A	DPWA $\bar{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.			

$\Lambda(1690)$ POLE RESIDUES

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

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow N\bar{K}$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.24 ± 0.05	-28 ± 5	SARANTSEV	19	DPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.251	3	¹ KAMANO	15	DPWA Multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma\pi$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.35 ± 0.07	175 ± 6	SARANTSEV	19	DPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.315	-173	¹ KAMANO	15	DPWA $\bar{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Lambda\eta$

MODULUS	PHASE ($^\circ$)	DOCUMENT ID	TECN	COMMENT
0.05 ± 0.02	88 ± 8	SARANTSEV	19	DPWA $\bar{K}N$ multichannel

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

0.00567 81 ¹KAMANO 15 DPWA Multichannel

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Lambda\sigma$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.08±0.02	-10 ± 6	SARANTSEV	19	DPWA $\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma(1385)\pi$, S-wave

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.11 ±0.06	170 ± 70	SARANTSEV	19	DPWA $\bar{K}N$ multichannel

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

0.134 168 ¹KAMANO 15 DPWA $\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma(1385)\pi$, D-wave

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.06 ±0.04	164 ± 15	SARANTSEV	19	DPWA $\bar{K}N$ multichannel

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

0.319 -22 ¹KAMANO 15 DPWA $\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15.

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow N\bar{K}^*(892)$, S-wave

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.05±0.04	SARANTSEV	19	DPWA $\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow N\bar{K}^*(892)$, D-wave

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.18+-0.05@-110+-45	SARANTSEV	19	DPWA $\bar{K}N$ multichannel

$\Lambda(1690)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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1685 to 1695 (≈ 1690) OUR ESTIMATE

1689 ±3	SARANTSEV	19	DPWA $\bar{K}N$ multichannel
1691 ±3	ZHANG	13A	DPWA $\bar{K}N$ multichannel
1695.7±2.6	KOISO	85	DPWA $K^-p \rightarrow \Sigma\pi$
1690 ±5	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1692 ±5	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1690 ±3	HEPP	76B	DPWA $K^-N \rightarrow \Sigma\pi$
1689 ±1	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$

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

1690 ±5	GOPAL	77	DPWA $\bar{K}N$ multichannel
1687 or 1689	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
1692 ±4	CARROLL	76	DPWA Isospin-0 total σ

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. Another D_{03} Λ at 1966 MeV is also suggested by MARTIN 77, but is very uncertain.

$\Lambda(1690)$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
60 to 80 (≈ 70) OUR ESTIMATE			
75 \pm 5	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
54 \pm 5	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
67.2 \pm 5.6	KOISO 85	DPWA	$K^- p \rightarrow \Sigma \pi$
61 \pm 5	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
64 \pm 10	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
82 \pm 8	HEPP 76B	DPWA	$K^- N \rightarrow \Sigma \pi$
60 \pm 4	KANE 74	DPWA	$K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
60 \pm 5	GOPAL 77	DPWA	$\bar{K}N$ multichannel
62 or 62	¹ MARTIN 77	DPWA	$\bar{K}N$ multichannel
38	CARROLL 76	DPWA	Isospin-0 total σ

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. Another D_{03} Λ at 1966 MeV is also suggested by MARTIN 77, but is very uncertain.

 $\Lambda(1690)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	20–30 %
Γ_2 $\Sigma \pi$	20–40 %
Γ_3 $\Lambda \sigma$	(5.0 \pm 2.0) %
Γ_4 $\Lambda \pi \pi$	\sim 25 %
Γ_5 $\Sigma \pi \pi$	\sim 20 %
Γ_6 $\Lambda \eta$	
Γ_7 $\Sigma(1385)\pi$, S -wave	(9 \pm 5) %
Γ_8 $\Sigma(1385)\pi$, D -wave	(3.0 \pm 2.0) %
Γ_9 $N\bar{K}^*(892)$, $S=1/2$, D -wave	
Γ_{10} $N\bar{K}^*(892)$, $S=3/2$, S -wave	
Γ_{11} $N\bar{K}^*(892)$, $S=3/2$, D -wave	

 $\Lambda(1690)$ BRANCHING RATIOS

<u>$\Gamma(N\bar{K})/\Gamma_{\text{total}}$</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_1/Γ
0.20 to 0.28 OUR ESTIMATE				
0.23 \pm 0.05	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel	
0.25 \pm 0.04	ZHANG 13A	DPWA	$\bar{K}N$ multichannel	
0.23 \pm 0.03	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$	
0.22 \pm 0.03	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.239	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel	
0.24 \pm 0.03	GOPAL 77	DPWA	See GOPAL 80	
0.28 or 0.26	² MARTIN 77	DPWA	$\bar{K}N$ multichannel	

¹From the preferred solution A in KAMANO 15.

²The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. Another D_{03} Λ at 1966 MeV is also suggested by MARTIN 77, but is very uncertain.

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.50 ± 0.10	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.387	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$ Γ_6/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. • • •			
not seen	¹ KAMANO 15	DPWA	Multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(\Lambda\sigma)/\Gamma_{\text{total}}$ Γ_3/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.05 ± 0.02	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.09 ± 0.05	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.062	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_8/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.03 ± 0.02	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.308	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=1/2, D\text{-wave})/\Gamma_{\text{total}}$ Γ_9/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. • • •			
not seen	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
not seen	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=3/2, S\text{-wave})/\Gamma_{\text{total}}$ Γ_{10}/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. • • •			
0.003	KAMANO 15	DPWA	Multichannel

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

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

not seen ¹KAMANO 15 DPWA Multichannel

¹From the preferred solution A in KAMANO 15.

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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-0.27 ± 0.03	ZHANG	13A	DPWA Multichannel
-0.34 ± 0.02	KOISO	85	DPWA $K^- p \rightarrow \Sigma\pi$
-0.25 ± 0.03	GOPAL	77	DPWA $\bar{K}N$ multichannel
-0.29 ± 0.03	HEPP	76B	DPWA $K^- N \rightarrow \Sigma\pi$
-0.28 ± 0.03	LONDON	75	HLBC $K^- p \rightarrow \Sigma^0\pi^0$
-0.28 ± 0.02	KANE	74	DPWA $K^- p \rightarrow \Sigma\pi$

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

-0.30 or -0.28 ¹MARTIN 77 DPWA $\bar{K}N$ multichannel

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. Another $D_{03}\Lambda$ at 1966 MeV is also suggested by MARTIN 77, but is very uncertain.

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Lambda\pi\pi$ $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

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

0.25 ± 0.02 ¹BARTLEY 68 HDBC $K^- p \rightarrow \Lambda\pi\pi$

¹BARTLEY 68 uses only cross-section data. The enhancement is not seen by PREVOST 71.

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma\pi\pi$ $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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0.21	ARMENTEROS68C	HDBC	$K^- N \rightarrow \Sigma\pi\pi$
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 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Lambda\eta$ $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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0.00 ± 0.03	BAXTER	73	DPWA $K^- p \rightarrow$ neutrals
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 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma(1385)\pi, S\text{-wave}$ $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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-0.28 ± 0.06	ZHANG	13A	DPWA Multichannel
$+0.27 \pm 0.04$	PREVOST	74	DPWA $K^- N \rightarrow \Sigma(1385)\pi$

 $\Lambda(1690)$ 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)
KOISO 85	NP A433 619	H. Koiso <i>et al.</i>	(TOKY, MASA)
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
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
CARROLL	76	PRL 37 806	A.S. Carroll <i>et al.</i>	(BNL) I
HEPP	76B	PL 65B 487	V. Hepp <i>et al.</i>	(CERN, HEIDH, MPIM) IJP
LONDON	75	NP B85 289	G.W. London <i>et al.</i>	(BNL, CERN, EPOL+)
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
PREVOST	74	NP B69 246	J. Prevost <i>et al.</i>	(SACL, CERN, HEID)
BAXTER	73	NP B67 125	D.F. Baxter <i>et al.</i>	(OXF) IJP
PREVOST	71	Amsterdam Conf.	J. Prevost	(CERN, HEID, SACL)
ARMENTEROS	68C	NP B8 216	R. Armenteros <i>et al.</i>	(CERN, HEID, SACL) I
BARTLEY	68	PRL 21 1111	J.H. Bartley <i>et al.</i>	(TUFTS, FSU, BRAN) I
