Λ(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).

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.

Λ(1890) POLE POSITION

/1(.	∧(1890) POLE POSITION						
REAL PART							
VALUE (MeV)• • • We do not use the followin	DOCUMENT ID			COMMENT			
. <u>-</u>	-				I		
1859^{+5}_{-7}		15		Multichannel			
1876				Multichannel			
¹ From the preferred solution A	in KAMANO 15,	, incom	patible v	vith solution B.			
-2×IMAGINARY PART VALUE (MeV)	DOCUMENT ID)	TECN	COMMENT			
• • • We do not use the followin	g data for average	es, fits,	limits, e	etc. • • •			
113^{+20}_{-4}	¹ KAMANO	15	DPWA	Multichannel			
145	ZHANG	13A	DPWA	Multichannel			
$^{ m 1}$ From the preferred solution A	in KAMANO 15,	, incom	patible v	vith solution B.	I		
The "normalized residue" is the residue divided by $\Gamma_{pole}/2$. Normalized residue in $KN \rightarrow \Lambda(1890) \rightarrow KN$ MODULUS PHASE (°) DOCUMENT ID TECN COMMENT • • 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.							
	in KAMANO 15.	<u>.</u>	5 DP\				
Normalized residue in $N\overline{K}$ –	in KAMANO 15. → \(\begin{align*} \(1890 \end{align*} \) \(\text{→} \)	Σπ		VA Multichannel			
Normalized residue in $N\overline{K}$ – MODULUS PHASE (°)	in KAMANO 15. → Λ(1890) → <u>DOCUMENT I</u>	Σπ	<u>TECN</u>	VA Multichannel			
Normalized residue in $N\overline{K}$ –	in KAMANO 15. → Λ(1890) → <u>DOCUMENT I</u>	Σπ _{ID} es, fits,	TECN	VA Multichannel			
Normalized residue in NK – MODULUS PHASE (°) • • • We do not use the following	in KAMANO 15. → Λ(1890) → DOCUMENT I g data for average 1 KAMANO	Σπ <u>ID</u> es, fits, 15	TECN	VA Multichannel COMMENT etc. • • •			
Normalized residue in $N\overline{K}$ – MODULUS PHASE (°) • • • We do not use the following 0.101 104	in KAMANO 15. → Λ(1890) → DOCUMENT I g data for average 1 KAMANO in KAMANO 15. → Λ(1890) → DOCUMENT I g data for average 1 KAMANO	Σπ ID es, fits, 15 Λη ID es, fits, 15	TECN limits, e DPW/	VA Multichannel COMMENT tc. • • • A Multichannel COMMENT			

Normalized	residue in $N\overline{K} \rightarrow$	<i>Λ</i> (1890) → 3	ΞK	
		•		TECN COMMENT
• • • We do	not use the following	data for averages	, fits,	limits, etc. • • •
0.0562	-85	$^{ m 1}$ KAMANO	15	DPWA Multichannel
$^{ m 1}$ From the	preferred solution A i	n KAMANO 15.		
Normalized	residue in $N\overline{K} \rightarrow$	Λ(1890) → 2	Σ(13	885)π, <i>P</i> -wave
MODULUS	PHASE (°)	DOCUMENT ID		TECN COMMENT
• • • We do	not use the following	data for averages	, fits,	limits, etc. • • •
0.295	-40	$^{ m 1}$ KAMANO	15	DPWA Multichannel
$^{ m 1}$ From the	preferred solution A i	n KAMANO 15.		
Normalized	residue in $N\overline{K} \rightarrow$	<i>Λ</i> (1890) → 2	Σ(13	$(85)\pi$, \emph{F} -wave
MODULUS	PHASE (°)	DOCUMENT ID		TECN COMMENT
• • • We do	not use the following	-		
0.064	127	¹ KAMANO	15	DPWA Multichannel
$^{ m 1}$ From the	preferred solution A i	n KAMANO 15.		
Normalized	residue in $N\overline{K} \rightarrow$	Λ(1890) → I	N <i>K</i> *	(892), <i>S</i> =1/2 , <i>P</i> -wave
MODULUS	PHASE (°)	DOCUMENT ID		TECN COMMENT
• • • We do	not use the following	data for averages	s, fits,	limits, etc. • • •
0.188	-160	$^{ m 1}$ KAMANO	15	DPWA Multichannel
$^{ m 1}$ From the	preferred solution A i	n KAMANO 15.		
Normalized	residue in $N\overline{K} \rightarrow$	Λ(1890) → /	N <i>K</i> *	(892), <i>S</i> =3/2 , <i>P</i> -wave
		•		TECN COMMENT
	not use the following			
0.209	15			DPWA Multichannel
$^{ m 1}$ From the	preferred solution A i	n KAMANO 15.		
Normalized	residue in $N\overline{K} \rightarrow$	Λ(1890) → I	N <i>K</i> *	(892), <i>S</i> =3/2, <i>F</i> -wave
	PHASE (°)	• •		
	not use the following			
0.0141	129	¹ KAMANO	15	
$^{ m 1}$ From the	preferred solution A i	n KAMANO 15.		
		Λ(1890) MAS	SS	
<i>VALUE</i> (MeV)		DOCUMENT ID		TECN COMMENT
1850 to 1910	(≈ 1890) OUR ESTII			
1900± 5		ZHANG	13A	DPWA Multichannel
1897 ± 5		GOPAL	80	DPWA $\overline{K}N \rightarrow \overline{K}N$
1908 ± 10		ALSTON	78	DPWA $\overline{K}N \rightarrow \overline{K}N$
1900± 5		GOPAL	77	
1894±10		HEMINGWAY		DPWA $K^- p \rightarrow \overline{K} N$
	not use the following			
1856 or 1868		¹ MARTIN	77	
1900		² NAKKASYAN	75	DPWA $K^-p \rightarrow \Lambda\omega$
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Λ(1890) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN CO	MMENT
60 to 200 (≈ 100) OUR ESTIMA	ΓΕ			
161 ± 15	ZHANG	13A	DPWA Mu	ultichannel
74 ± 10	GOPAL	80	DPWA \overline{K}	$N \rightarrow \overline{K}N$
119 ± 20	ALSTON	78	DPWA \overline{K}	$N \rightarrow \overline{K}N$
72 ± 10	GOPAL	77	DPWA \overline{K}	V multichannel
107 ± 10	HEMINGWAY	75	DPWA K	$p \rightarrow \overline{K}N$
• • • We do not use the following	data for averages	s, fits,	limits, etc.	• • •
191 or 193	¹ MARTIN			
100	² NAKKASYAN	75	DPWA K	$^-$ p $ ightarrow$ $\Lambda\omega$
1 The two MARTIN 77 values are	o from a T matrix	, nolo	and from a	Broit Wigner fit

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

Λ(1890) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
$\overline{\Gamma_1}$	NK	20–35 %
Γ_2	$\Sigma \pi$	3–10 %
Γ_3	$\Lambda\eta$	
Γ_4	ΞK	
Γ_5	$\Sigma(1385)\pi$	seen
Γ_6	$arSigma(1385)\pi$, $ extit{\it P}$ -wave	
Γ_7	$arSigma(1385)\pi$, $ extit{\it F}$ -wave	
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 \varLambda and \varSigma Resonances.

$\Gamma(N\overline{K})/\Gamma_{\text{total}}$					Γ_1/Γ
VALUE	DOCUMENT ID		TECN	COMMENT	
0.20 to 0.35 OUR ESTIMATE					
0.37 ± 0.03	ZHANG	13A	DPWA	Multichannel	
0.20 ± 0.02	GOPAL	80	DPWA	$\overline{K} N \rightarrow \overline{K} N$	
0.34 ± 0.05	ALSTON	78	DPWA	$\overline{K} N \rightarrow \overline{K} N$	
0.24 ± 0.04	HEMINGWAY	75	DPWA	$K^- p \rightarrow \overline{K} N$	
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 $^{^{}m 1}$ 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.

² Found in one of two best solutions.

• • • We do not use the following		, fits,	limits, e	etc. • • •	
0.305	¹ KAMANO	15		Multichannel	
0.18 ± 0.02	GOPAL	77	DPWA	See GOPAL 80	
0.36 or 0.34	² MARTIN	77	DPWA	$\overline{K}N$ multichannel	
$^{ m 1}$ From the preferred solution A i	n KAMANO 15.				
² The two MARTIN 77 values are	e from a T-matrix	pole	and from	m a Breit-Wigner f	it.
$\Gamma(\Sigma\pi)/\Gamma_{total}$					Γ_2/Γ
VALUE	DOCUMENT ID		TECN	COMMENT	- 2/ -
<0.03	LANGBEIN	72		$\overline{K}N$ multichannel	
• • We do not use the following	=				
0.04	¹ KAMANO	15		Multichannel	
	_	15	DEVVA	Multichanner	
¹ From the preferred solution A i	n KAMANO 15.				
$\Gamma(\Lambda\eta)/\Gamma_{total}$					Γ_3/Γ
VALUE	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following					
0.012	¹ KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A i	n KAMANO 15.				
$\Gamma(\Xi K)/\Gamma_{\text{total}}$					Γ_4/Γ
VALUE	DOCUMENT ID		TECN	COMMENT	
$\bullet~\bullet~$ We do not use the following	data for averages	, fits,	limits, e	etc. • • •	
0.009	¹ KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A i	n KAMANO 15.				
-/-/···					
$\Gamma(\Sigma(1385)\pi, P$ -wave $)/\Gamma_{ ext{total}}$					Γ_6/Γ
VALUE	DOCUMENT ID				
$\bullet~\bullet~$ We do not use the following	data for averages	, fits,	limits, e	etc. • • •	
0.453	¹ KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A i	n KAMANO 15.				
5/5/1005					- /-
$\Gamma(\Sigma(1385)\pi, F\text{-wave})/\Gamma_{\text{total}}$					Γ_7/Γ
VALUE	DOCUMENT ID			COMMENT	
ullet $ullet$ We do not use the following		, fits,	limits, e	etc. • • •	
0.019	¹ KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A i	n KAMANO 15.				
F(NV*(000) C 1/0 D	\			•	- /-
$\Gamma(N\overline{K}^*(892), S=1/2, P-wave)$			TECN		Γ ₁₀ /Γ
VALUE	DOCUMENT ID				
ullet $ullet$ We do not use the following		, tits,	limits, e	etc. • • •	
0.073	¹ KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A i	n KAMANO 15.				

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$\Gamma(N\overline{K}^*(892), S=3/2)$	2, <i>P</i> -wave)/Γ _{total}			Γ ₁₁ /Γ
VALUE				COMMENT
	e following data for average			
0.088	¹ KAMANO	_	DPWA	Multichannel
¹ From the preferred s	solution A in KAMANO 15.			
$\Gamma(N\overline{K}^*(892), S=3/3)$	2, <i>F</i> -wave)/Γ _{total}			Γ ₁₂ /Ι
VALUE	<u>DOCUMENT ID</u>		TECN	COMMENT
ullet $ullet$ We do not use the	e following data for average	s, fits,	limits, e	etc. • • •
0.001	$^{ m 1}$ KAMANO	15	DPWA	Multichannel
$^{ m 1}$ From the preferred s	solution A in KAMANO 15.			
(Γ.Γ.) ^{1/2} /Γin Ν	$\overline{K} \rightarrow \Lambda(1890) \rightarrow \Sigma \pi$			(Γ ₁ Γ ₂) ^{1/2} /Ι
VALUE	DOCUMENT ID		TECN	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
-0.09 ± 0.02	ZHANG			
$-0.09\!\pm\!0.03$				$\overline{K}N$ multichannel
• • • We do not use th	e following data for average	s, fits,	limits, e	etc. • • •
+0.15 or +0.14	$^{ m 1}$ MARTIN	77	DPWA	$\overline{K}N$ multichannel
1 The two MARTIN 7	77 values are from a T-matri	ix nole	and from	m a Breit-Wigner fit
$(\Gamma_i \Gamma_f)^{\frac{1}{2}} / \Gamma_{\text{total}} \text{ in } N^{\frac{1}{2}}$	$\overline{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(138)$	$35)\pi$,	P-wave	$(\Gamma_1\Gamma_6)^{\frac{1}{2}}/\Gamma_1$
VALUE	DOCUMENT ID			
< 0.03	CAMERON	78	DPWA	$K^- p \rightarrow \Sigma(1385) \pi$
<u></u>			_	(Γ ₁ Γ ₇) ^{1/2} /Ι
, ,	$\overline{K} \rightarrow \Lambda(1890) \rightarrow \Sigma(138)$	•		\ - '/ /
<u>VALUE</u>	<u>DOCUMENT ID</u> ZHANG	124	DDWA	Multiple med
-0.31 ± 0.04 -0.126 ± 0.055	1 CAMERON	13A 78	DPWA	$K^- p \rightarrow \Sigma(1385) \pi$
_				
- The published sign i	has been changed to be in a	ccora	with the	baryon-first convention.
$(\Gamma_1\Gamma_2)^{\frac{1}{2}}/\Gamma_1$ in $N^{\frac{1}{2}}$	$\overline{K} \rightarrow \Lambda(1890) \rightarrow N\overline{K}^*(1890)$	802)	S=1/2	(Γ ₁ Γ ₉) ^{1/2} /Ι
VALUE	DOCUMENT ID	-	TECN_	COMMENT
-0.17 ± 0.05	ZHANG			Multichannel
-0.07 ± 0.03 -0.07 ± 0.03	1,2 CAMERON			$K^- p \rightarrow N \overline{K}^*$
_	P_3 and F_3 waves are each (r
2 The nublished sign I	has been changed to be in a	o.oo.	with the	harvon-first convention
The published sign i	nas seen changed to se ill a	ccoru	WILLI LITE	baryon-mac convention.
$(\Gamma_i \Gamma_f)^{\frac{1}{2}} / \Gamma_{total}$ in N	$\overline{K} \rightarrow \Lambda(1890) \rightarrow N\overline{K}^*(3)$	892).	<i>S</i> =3/2	. <i>F</i> -wave
(- i · i) / · total ··· · · ·	(-556)	~ ~ _,,	_/ -	$(\Gamma_1\Gamma_{12})^{rac{1}{2}}/$
VALUE	DOCUMENT ID		TECH	
VALUE				COMMENT
-0.11 ± 0.03	<u>DOCUMENT ID</u> ZHANG	13A	TECN DDWA	<u>COMMENT</u> Multichannel

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∧(1890) REFERENCES

KAMANO ZHANG PDG GOPAL ALSTON Also CAMERON CAMERON	15 13A 82 80 78	PR C92 025205 PR C88 035205 PL 111B 1 Toronto Conf. 159 PR D18 182 PRL 38 1007 NP B143 189	H. Kamano et al. H. Zhang et al. M. Roos et al. G.P. Gopal M. Alston-Garnjost et al. W. Cameron et al.	(ANL, OSAK) (KSU) (HELS, CIT, CERN) (RHEL) IJP (LBL, MTHO+) IJP (LBL, MTHO+) IJP (RHEL, LOIC) IJP
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	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 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

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