$\Lambda(1810)\ 1/2^+$

$I(J^P) = 0(\frac{1}{2}^+)$ Status: $\ast\ast\ast$

$\Lambda(1810)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1773± 7	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

$2097^{+40}_{-\ 1}$	[1] KAMANO	15	DPWA	Multichannel
1780	ZHANG	13A	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports M = 1841^{+3}_{-4} MeV.

$-2\times$IMAGINARY PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
38±14	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

166^{+64}_{-12}	[1] KAMANO	15	DPWA	Multichannel
64	ZHANG	13A	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B Reports Γ = 62^{+6}_{-4} MeV.

$\Lambda(1810)$ POLE RESIDUES

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.018±0.008	**65 ± 26**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

0.205	− 63	[1] KAMANO	15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.045 ±0.020	**−143 ± 24**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

0.0325	29	[1] KAMANO	15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to \Lambda\eta$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT

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

0.155	165	[1] KAMANO	15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to \Lambda\sigma$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.055±0.020	**30 ± 16**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(1810) \to \Xi K$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0937	−64	[1] KAMANO 15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to \Sigma(1385)\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.08 ±0.03	**−50 ± 30**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.244	−10	[1] KAMANO 15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to N\overline{K}{}^*(892)$, 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. • • •				
0.159	−97	[1] KAMANO 15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \to \Lambda(1810) \to N\overline{K}{}^*(892)$, S=3/2, P-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.05 ±0.04		SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0497	2	[1] KAMANO 15	DPWA	Multichannel

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

$\Lambda(1810)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1740 to 1840 (≈ 1790) OUR ESTIMATE			
1773± 7	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
1821±10	ZHANG 13A	DPWA	Multichannel
1841±20	GOPAL 80	DPWA	$\overline{K}N \to \overline{K}N$
1735± 5	CARROLL 76	DPWA	Isospin-0 total σ
1746±10	PREVOST 74	DPWA	$K^-N \to \Sigma(1385)\pi$
1780±20	LANGBEIN 72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1853±20	GOPAL 77	DPWA	$\overline{K}N$ multichannel
1861 or 1953	[1] MARTIN 77	DPWA	$\overline{K}N$ multichannel
1755	KIM 71	DPWA	K-matrix analysis
1800	ARMENTEROS70	HBC	$\overline{K}N \to \overline{K}N$
1750	ARMENTEROS70	HBC	$\overline{K}N \to \Sigma\pi$

VALUE	DOCUMENT ID	TECN	COMMENT
1690 ± 10	BARBARO-... 70	HBC	$\overline{K}N \to \Sigma\pi$
1740	BAILEY 69	DPWA	$\overline{K}N \to \overline{K}N$
1745	ARMENTEROS68B	HBC	$\overline{K}N \to \overline{K}N$

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

$\Lambda(1810)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
50 to 170 ($\approx$ 110) OUR ESTIMATE			
39 ± 15	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
174 ± 50	ZHANG 13A	DPWA	Multichannel
164 ± 20	GOPAL 80	DPWA	$\overline{K}N \to \overline{K}N$
90 ± 20	CAMERON 78B	DPWA	$K^- p \to N\overline{K}^*$
46 ± 20	PREVOST 74	DPWA	$K^- N \to \Sigma(1385)\pi$
120 ± 10	LANGBEIN 72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
166 ± 20	GOPAL 77	DPWA	$\overline{K}N$ multichannel
535 or 585	[1] MARTIN 77	DPWA	$\overline{K}N$ multichannel
28	CARROLL 76	DPWA	Isospin-0 total σ
35	KIM 71	DPWA	K-matrix analysis
30	ARMENTEROS70	HBC	$\overline{K}N \to \overline{K}N$
70	ARMENTEROS70	HBC	$\overline{K}N \to \Sigma\pi$
22	BARBARO-... 70	HBC	$\overline{K}N \to \Sigma\pi$
300	BAILEY 69	DPWA	$\overline{K}N \to \overline{K}N$
147	ARMENTEROS68B	HBC	

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

$\Lambda(1810)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	0.05 to 0.35
Γ_2	$\Sigma\pi$	(16 ± 5) %
Γ_3	$\Lambda\eta$	
Γ_4	ΞK	
Γ_5	$\Sigma(1385)\pi$	(40 ± 15) %
Γ_6	$N\overline{K}^*(892)$	30–60 %
Γ_7	$N\overline{K}^*(892)$, $S=1/2$, P-wave	
Γ_8	$N\overline{K}^*(892)$, $S=3/2$, P-wave	

$\Lambda(1810)$ BRANCHING RATIOS

$\Gamma(N\overline{K})/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.05 to 0.35 OUR ESTIMATE			
0.025 ± 0.013	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
0.19 ± 0.08	ZHANG 13A	DPWA	$\overline{K}N$ multichannel
0.24 ± 0.04	GOPAL 80	DPWA	$\overline{K}N \to \overline{K}N$
0.36 ± 0.05	LANGBEIN 72	IPWA	$\overline{K}N$ multichannel

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

0.225	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
0.21 $\pm$0.04	GOPAL	77	DPWA	See GOPAL 80
0.52 or 0.49	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel
0.30	KIM	71	DPWA	K-matrix analysis
0.15	ARMENTEROS70		DPWA	$\overline{K}N \to \overline{K}N$
0.55	BAILEY	69	DPWA	$\overline{K}N \to \overline{K}N$
0.4	ARMENTEROS68B		DPWA	$\overline{K}N \to \overline{K}N$

[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
0.16 $\pm$0.05	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	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. • • •

0.111	[1] KAMANO	15	DPWA	Multichannel

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

$\Gamma(\Xi K)/\Gamma_{total}$ Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT

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

0.051	[1] KAMANO	15	DPWA	Multichannel

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

$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$ Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.40 $\pm$0.15	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

0.600	[1] KAMANO	15	DPWA	Multichannel

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

$\Gamma(N\overline{K}^*(892), S=1/2, P\text{-wave})/\Gamma_{total}$ Γ_7/Γ

VALUE	DOCUMENT ID		TECN	COMMENT

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

0.003	[1] KAMANO	15	DPWA	Multichannel

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1810) \to \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.08 ± 0.05	ZHANG	13A	DPWA	Multichannel
-0.24 ± 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel

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

+0.25 or +0.23	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
< 0.01	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
0.17	KIM	71	DPWA	K-matrix analysis
+0.20	[2] ARMENTEROS	70	DPWA	$\overline{K}N \to \Sigma\pi$
−0.13±0.03	BARBARO-...	70	DPWA	$\overline{K}N \to \Sigma\pi$

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

[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 $N\overline{K} \to \Lambda(1810) \to \Sigma(1385)\pi$ $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
+0.18±0.10	PREVOST	74	DPWA	$K^-N \to \Sigma(1385)\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1810) \to N\overline{K}^*(892)$, $S{=}1/2$, P-wave $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.14±0.03	[1] CAMERON	78B	DPWA	$K^-p \to N\overline{K}^*$

[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 $N\overline{K} \to \Lambda(1810) \to N\overline{K}^*(892)$, $S{=}3/2$, P-wave $(\Gamma_1\Gamma_8)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
+0.38±0.06	ZHANG	13A	DPWA	Multichannel
+0.35±0.06	CAMERON	78B	DPWA	$K^-p \to N\overline{K}^*$

$\Lambda(1810)$ REFERENCES

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)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
CAMERON	78B	NP B146 327	W. Cameron *et al.*	(RHEL, LOIC) 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
CARROLL	76	PRL 37 806	A.S. Carroll *et al.*	(BNL) I
PREVOST	74	NP B69 246	J. Prevost *et al.*	(SACL, CERN, HEID)
LANGBEIN	72	NP B47 477	W. Langbein, F. Wagner	(MPIM) IJP
KIM	71	PRL 27 356	J.K. Kim	(HARV) IJP
Also		Duke Conf. 161	J.K. Kim	(HARV) IJP
		Hyperon Resonances, 1970		
ARMENTEROS 70		Duke Conf. 123	R. Armenteros *et al.*	(CERN, HEID, SACL) IJP
		Hyperon Resonances, 1970		
BARBARO-...	70	Duke Conf. 173	A. Barbaro-Galtieri	(LRL) IJP
		Hyperon Resonances, 1970		
BAILEY	69	Thesis UCRL 50617	J.M. Bailey	(LLL) IJP
ARMENTEROS	68B	NP B8 195	R. Armenteros *et al.*	(CERN, HEID, SACL) IJP