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

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

$\Lambda(1810)$ 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×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 $N\overline{K} \rightarrow \Lambda(1810) \rightarrow N\overline{K}$

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 $N\overline{K} \rightarrow \Lambda(1810) \rightarrow \Sigma\pi$

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 $N\overline{K} \rightarrow \Lambda(1810) \rightarrow \Lambda\eta$

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.

Λ(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	ARMENTEROS	70	HBC	$\overline{K}N \rightarrow \overline{K}N$
1750	ARMENTEROS	70	HBC	$\overline{K}N \rightarrow \Sigma\pi$
1690±10	BARBARO-...	70	HBC	$\overline{K}N \rightarrow \Sigma\pi$
1740	BAILEY	69	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1745	ARMENTEROS	68B	HBC	$\overline{K}N \rightarrow \overline{K}N$

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

Λ(1810) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
50 to 170 (≈ 110) OUR ESTIMATE				
39±15	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
174±50	ZHANG	13A	DPWA	Multichannel
164±20	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
90±20	CAMERON	78B	DPWA	$K^- p \rightarrow N\overline{K}^*$
46±20	PREVOST	74	DPWA	$K^- N \rightarrow \Sigma(1385)\pi$
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	ARMENTEROS	70	HBC	$\overline{K}N \rightarrow \overline{K}N$
70	ARMENTEROS	70	HBC	$\overline{K}N \rightarrow \Sigma\pi$
22	BARBARO-...	70	HBC	$\overline{K}N \rightarrow \Sigma\pi$
300	BAILEY	69	DPWA	$\overline{K}N \rightarrow \overline{K}N$
147	ARMENTEROS	68B	HBC	

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

Λ(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	

Λ(1810) BRANCHING RATIOS

$\Gamma(N\overline{K})/\Gamma_{total}$ 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 ±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	ARMENTEROS	70	DPWA	$\overline{K}N \to \overline{K}N$
0.55	BAILEY	69	DPWA	$\overline{K}N \to \overline{K}N$
0.4	ARMENTEROS	68B	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 ±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 ±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.

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1810) \to \Sigma(1385)\pi$ — $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.18\pm0.10$	PREVOST	74	DPWA	$K^- N \to \Sigma(1385)\pi$

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

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.

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1810) \to N\overline{K}^*(892), S{=}3/2, P\text{-wave}$ — $(\Gamma_1\Gamma_8)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.38\pm0.06$	ZHANG	13A	DPWA	Multichannel
$+0.35\pm0.06$	CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$

Λ(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
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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