$\Lambda(1800)$ $1/2^-$

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

$\Lambda(1800)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1809±9	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1729	ZHANG	13A	DPWA	Multichannel

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
205±16	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
198	ZHANG	13A	DPWA	Multichannel

$\Lambda(1800)$ POLE RESIDUES

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

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.34±0.07	**103 ± 8**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.30±0.06	**−123 ± 8**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow \Lambda\eta$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.06±0.03	**75 ± 10**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow \Lambda\sigma$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.24±0.05	**25 ± 10**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow \Lambda\omega$, S=1/2, S-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.12±0.04	**−114 ± 30**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow \Lambda\omega$, S=3/2, D-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.08±0.03	**−90 ± 17**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow \Sigma(1385)\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.16±0.06	**−140 ± 35**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow N\overline{K}^*(892)$, S=1/2, S-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.18±0.06	**65 ± 40**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow N\overline{K}^*(892)$, S=3/2, D-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.09±0.07		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Lambda(1800)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1750 to 1850 (≈ 1800) OUR ESTIMATE				
1811±10	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1783±19	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
1841±10	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1725±20	ALSTON-...	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1830±20	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1845±10	MANLEY	02	DPWA	$\overline{K}N$ multichannel
1825±20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1767 or 1842	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1780	KIM	71	DPWA	K-matrix analysis
1872±10	BRICMAN	70B	DPWA	$\overline{K}N \rightarrow \overline{K}N$

$\Lambda(1800)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
150 to 250 (≈ 200) OUR ESTIMATE				
209±18	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
256±35	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
228±20	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
185±20	ALSTON-...	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
70±15	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
518±84	MANLEY	02	DPWA	$\overline{K}N$ multichannel
230±20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
435 or 473	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
40	KIM	71	DPWA	K-matrix analysis
100±20	BRICMAN	70B	DPWA	$\overline{K}N \rightarrow \overline{K}N$

$\Lambda(1800)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	25–40 %
Γ_2	$\Sigma\pi$	(27 ±6) %
Γ_3	$\Lambda\sigma$	(15 ±4) %
Γ_4	$\Sigma(1385)\pi$	(9 ±4) %

Γ_5	$\Lambda\eta$	0.01 to 0.10
Γ_6	$N\overline{K}^*(892)$	seen
Γ_7	$N\overline{K}^*(892)$, S=1/2, S-wave	
Γ_8	$N\overline{K}^*(892)$, S=3/2, D-wave	

Λ(1800) BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.25 to 0.40 OUR ESTIMATE				
0.35±0.07	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.13±0.06	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
0.36±0.04	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.28±0.05	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
0.35±0.15	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.24±0.10	MANLEY	02	DPWA	$\overline{K}N$ multichannel
0.37±0.05	GOPAL	77	DPWA	See GOPAL 80
1.21 or 0.70	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
0.80	KIM	71	DPWA	K-matrix analysis
0.18±0.02	BRICMAN	70B	DPWA	$\overline{K}N \to \overline{K}N$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.27±0.06	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda\sigma)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.15±0.04	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$ — Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.09±0.04	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda\eta)/\Gamma_{total}$ — Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.01 to 0.10 OUR ESTIMATE				
0.010±0.005	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.06 ±0.05	ZHANG	13A	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1800) \to \Sigma\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
−0.07±0.02	ZHANG	13A	DPWA	Multichannel
−0.08±0.05	GOPAL	77	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.74 or −0.43	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
0.24	KIM	71	DPWA	K-matrix analysis

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1800) \to \Sigma(1385)\pi$ $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.09 ± 0.05	ZHANG	13A	DPWA	Multichannel
$+0.056 \pm 0.028$	[2] CAMERON	78	DPWA	$K^- p \to \Sigma(1385)\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1800) \to N\overline{K}^*(892)$, S=1/2, S-wave $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.13 ± 0.02	ZHANG	13A	DPWA	Multichannel
-0.17 ± 0.03	[2] CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1800) \to N\overline{K}^*(892)$, S=3/2, D-wave $(\Gamma_1\Gamma_8)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.13 ± 0.04	CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$

Λ(1800) FOOTNOTES

[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.

Λ(1800) REFERENCES

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)
MANLEY	02	PRL 88 012002	D.M. Manley *et al.*	(BNL Crystal Ball Collab.)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
ALSTON-...	78	PR D18 182	M. Alston-Garnjost *et al.*	(LBL, MTHO+) IJP
Also		PRL 38 1007	M. Alston-Garnjost *et al.*	(LBL, MTHO+) IJP
CAMERON	78	NP B143 189	W. Cameron *et al.*	(RHEL, LOIC) 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)
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BRICMAN	70B	PL 33B 511	C. Bricman, M. Ferro-Luzzi, J.P. Lagnaux	(CERN) IJP