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

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

Λ(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

Λ(1800) POLE RESIDUES

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

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

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

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

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

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

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

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

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

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

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

Normalized residue in $N\overline{K} \to \Lambda(1800) \to N\overline{K}^*(892)$, 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 $N\overline{K} \to \Lambda(1800) \to N\overline{K}^*(892)$, 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				
1800.9±13.3±12.6	ABLIKIM	25AF	BES3	$\psi(3686) \to \Lambda\overline{\Sigma}^0\pi^0 +$ c.c. (PWA)
1811 ±10	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1783 ±19	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
1841 ±10	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1725 ±20	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
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	$\overline{K}N \to \overline{K}N$

$\Lambda(1800)$ WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
150 to 250 (≈ 200) OUR ESTIMATE				
208.8±14.5±36.7	ABLIKIM	25AF	BES3	$\psi(3686) \to \Lambda\overline{\Sigma}^0\pi^0 +$ c.c. (PWA)
209 ±18	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
256 ±35	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
228 ±20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
185 ±20	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
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	$\overline{K}N \to \overline{K}N$

Λ(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
$-0.09\ \pm0.05$	ZHANG	13A	DPWA	Multichannel
$+0.056\pm0.028$	[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	$K^-p \to N\overline{K}^*$

$\Lambda(1800)$ 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.

$\Lambda(1800)$ REFERENCES

ABLIKIM	25AF	JHEP 2502 212	M. Ablikim *et al.*	(BESIII Collab.)
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)
Also		NP B126 285	B.R. Martin, M.K. Pidcock	(LOUC) IJP
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 Hyperon Resonances, 1970	J.K. Kim	(HARV) IJP
BRICMAN	70B	PL 33B 511	C. Bricman, M. Ferro-Luzzi, J.P. Lagnaux	(CERN) IJP