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

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

This is the second resonance in the S_{01} wave, the first being the $\Lambda(1670)$.

$\Lambda(1800)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • 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
• • • We do not use the following data for averages, fits, limits, etc. • • •				
198	ZHANG	13A	DPWA	Multichannel

$\Lambda(1800)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1720 to 1850 (≈ 1800) OUR ESTIMATE				
1783±19	ZHANG	13A	DPWA	Multichannel
1845±10	MANLEY	02	DPWA	$\overline{K}N$ multichannel
1841±10	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1725±20	ALSTON-...	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1825±20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1830±20	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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
200 to 400 (≈ 300) OUR ESTIMATE				
256±35	ZHANG	13A	DPWA	Multichannel
518±84	MANLEY	02	DPWA	$\overline{K}N$ multichannel
228±20	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
185±20	ALSTON-...	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
230±20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
70±15	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
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	$\Sigma\pi$	seen
Γ_3	$\Sigma(1385)\pi$	seen
Γ_4	$\Lambda\eta$	(6 ± 5) %
Γ_5	$N\overline{K}^*(892)$	seen
Γ_6	$N\overline{K}^*(892)$, S=1/2, S-wave	
Γ_7	$N\overline{K}^*(892)$, S=3/2, D-wave	

$\Lambda(1800)$ 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				
0.13 ± 0.06	ZHANG	13A	DPWA	Multichannel
0.24 ± 0.10	MANLEY	02	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. • • •				
0.37 ± 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	$\overline{K}N \to \overline{K}N$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ 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 $N\overline{K} \to \Lambda(1800) \to \Sigma(1385)\pi$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.09 ± 0.05	ZHANG	13A	DPWA	Multichannel
$+0.056\pm0.028$	[2] CAMERON	78	DPWA	$K^- p \to \Sigma(1385)\pi$

$\Gamma(\Lambda\eta)/\Gamma_{total}$ — Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.06 ± 0.05	ZHANG	13A	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow N\overline{K}^*(892)$, S=1/2, S-wave $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Lambda(1800) \rightarrow N\overline{K}^*(892)$, S=3/2, D-wave $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$

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

$\Lambda(1800)$ 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

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	J.K. Kim	(HARV) IJP
Hyperon Resonances, 1970				
BRICMAN	70B	PL 33B 511	C. Bricman, M. Ferro-Luzzi, J.P. Lagnaux	(CERN) IJP