$\Lambda(1800)\ S_{01}$

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

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

Λ(1800) MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1720 to 1850 (≈ 1800) OUR ESTIMATE				
1845±10	MANLEY	02	DPWA	$\overline{K}N$ multichannel
1841±10	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1725±20	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
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	$\overline{K}N \to \overline{K}N$

Λ(1800) WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
200 to 400 (≈ 300) OUR ESTIMATE				
518±84	MANLEY	02	DPWA	$\overline{K}N$ multichannel
228±20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
185±20	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
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	$\overline{K}N \to \overline{K}N$

Λ(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	$N\overline{K}^*(892)$	seen
Γ_5	$N\overline{K}^*(892)$, S=1/2, S-wave	
Γ_6	$N\overline{K}^*(892)$, S=3/2, D-wave	

The above branching fractions are our estimates, not fits or averages.

$\Lambda(1800)$ BRANCHING RATIOS

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.25 to 0.40 OUR ESTIMATE				
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	$\overline{K}N \to \overline{K}N$

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

VALUE	DOCUMENT ID		TECN	COMMENT
-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

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

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1800) \to N\overline{K}^*(892)$, S=1/2, S-wave — $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1800) \to N\overline{K}^*(892)$, S=3/2, D-wave — $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

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.

Λ(1800) REFERENCES

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	77	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	77B	NP B126 266	B.R. Martin, M.K. Pidcock	(LOUC)	
Also	77C	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	70	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