$\Lambda(1800)$ S_{01}

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

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

$\Lambda(1800)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1720 to 1850 (≈ 1800) OUR ESTIMATE				
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	$\overline{K}N \to \overline{K}N$

$\Lambda(1800)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
200 to 400 (≈ 300) OUR ESTIMATE				
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	$\overline{K}N \to \overline{K}N$

$\Lambda(1800)$ 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	$N\overline{K}^*(892)$	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.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.25 to 0.40 OUR ESTIMATE				
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
−0.08±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
+0.056±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 — $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ 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

GOPAL	80	Toronto Conf. 159		(RHEL)	IJP
ALSTON-...	78	PR D18 182	Alston-Garnjost, Kenney+	(LBL, MTHO, CERN)	IJP
Also	77	PRL 38 1007	Alston-Garnjost, Kenney+	(LBL, MTHO, CERN)	IJP
CAMERON	78	NP B143 189	+Franek, Gopal, Bacon, Butterworth+	(RHEL, LOIC)	IJP
CAMERON	78B	NP B146 327	+Franek, Gopal, Kalmus, McPherson+	(RHEL, LOIC)	IJP
GOPAL	77	NP B119 362	+Ross, VanHorn, McPherson+	(LOIC, RHEL)	IJP
MARTIN	77	NP B127 349	+Pidcock, Moorhouse	(LOUC, GLAS)	IJP
Also	77B	NP B126 266	Martin, Pidcock	(LOUC)	
Also	77C	NP B126 285	Martin, Pidcock	(LOUC)	IJP
LANGBEIN	72	NP B47 477	+Wagner	(MPIM)	IJP
KIM	71	PRL 27 356		(HARV)	IJP
Also	70	Duke Conf. 161	Kim	(HARV)	IJP
BRICMAN	70B	PL 33B 511	+Ferro-Luzzi, Lagnaux	(CERN)	IJP