$$\Lambda(1810)\ 1/2^+$$

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

Almost all the recent analyses contain a P_{01} state, and sometimes two of them, but the masses, widths, and branching ratios vary greatly. See also the $\Lambda(1600)$ P_{01}.

$\Lambda(1810)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1750 to 1850 ($\approx$ 1810) OUR ESTIMATE				
1841 ± 20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1853 ± 20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1735 ± 5	CARROLL	76	DPWA	Isospin-0 total σ
1746 ± 10	PREVOST	74	DPWA	$K^-N \to \Sigma(1385)\pi$
1780 ± 20	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
$\bullet\bullet\bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet\bullet\bullet$				
1861 or 1953	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1755	KIM	71	DPWA	K-matrix analysis
1800	ARMENTEROS70	HBC		$\overline{K}N \to \overline{K}N$
1750	ARMENTEROS70	HBC		$\overline{K}N \to \Sigma\pi$
1690 ± 10	BARBARO-...	70	HBC	$\overline{K}N \to \Sigma\pi$
1740	BAILEY	69	DPWA	$\overline{K}N \to \overline{K}N$
1745	ARMENTEROS68B	HBC		$\overline{K}N \to \overline{K}N$

$\Lambda(1810)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
50 to 250 ($\approx$ 150) OUR ESTIMATE				
164 ± 20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
90 ± 20	CAMERON	78B	DPWA	$K^-p \to N\overline{K}^*$
166 ± 20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
46 ± 20	PREVOST	74	DPWA	$K^-N \to \Sigma(1385)\pi$
120 ± 10	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
$\bullet\bullet\bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet\bullet\bullet$				
535 or 585	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
28	CARROLL	76	DPWA	Isospin-0 total σ
35	KIM	71	DPWA	K-matrix analysis
30	ARMENTEROS70	HBC		$\overline{K}N \to \overline{K}N$
70	ARMENTEROS70	HBC		$\overline{K}N \to \Sigma\pi$
22	BARBARO-...	70	HBC	$\overline{K}N \to \Sigma\pi$
300	BAILEY	69	DPWA	$\overline{K}N \to \overline{K}N$
147	ARMENTEROS68B	HBC		

$\Lambda(1810)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	20–50 %
Γ_2	$\Sigma\pi$	10–40 %
Γ_3	$\Sigma(1385)\pi$	seen
Γ_4	$N\overline{K}^*(892)$	30–60 %
Γ_5	$N\overline{K}^*(892)$, $S=1/2$, P-wave	
Γ_6	$N\overline{K}^*(892)$, $S=3/2$, P-wave	

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

$\Lambda(1810)$ 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
0.2 to 0.5 OUR ESTIMATE				
0.24 ± 0.04	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.36 ± 0.05	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.21 ± 0.04	GOPAL	77	DPWA	See GOPAL 80
0.52 or 0.49	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
0.30	KIM	71	DPWA	K-matrix analysis
0.15	ARMENTEROS70		DPWA	$\overline{K}N \to \overline{K}N$
0.55	BAILEY	69	DPWA	$\overline{K}N \to \overline{K}N$
0.4	ARMENTEROS68B		DPWA	$\overline{K}N \to \overline{K}N$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1810) \to \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.24 ± 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$+0.25$ or $+0.23$	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
$<\ 0.01$	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
0.17	KIM	71	DPWA	K-matrix analysis
$+0.20$	[2] ARMENTEROS70		DPWA	$\overline{K}N \to \Sigma\pi$
-0.13 ± 0.03	BARBARO-...	70	DPWA	$\overline{K}N \to \Sigma\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1810) \to \Sigma(1385)\pi$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.18\pm0.10$	PREVOST	74	DPWA	$K^-N \to \Sigma(1385)\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1810) \to N\overline{K}^*(892)$, $S=1/2$, P-wave $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.14 ± 0.03	[2] CAMERON	78B	DPWA	$K^-p \to N\overline{K}^*$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1810) \to N\overline{K}{}^*(892),\ S{=}3/2,\ P\text{-wave}\quad (\Gamma_1\Gamma_6)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.35\pm0.06$	CAMERON	78B	DPWA	$K^-p \to N\overline{K}{}^*$

Λ(1810) 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(1810) REFERENCES

GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) 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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CARROLL	76	PRL 37 806	A.S. Carroll *et al.*	(BNL) I
PREVOST	74	NP B69 246	J. Prevost *et al.*	(SACL, CERN, HEID)
LANGBEIN	72	NP B47 477	W. Langbein, F. Wagner	(MPIM) IJP
KIM	71	PRL 27 356	J.K. Kim	(HARV) IJP
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ARMENTEROS	70	Duke Conf. 123	R. Armenteros *et al.*	(CERN, HEID, SACL) IJP
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BARBARO-...	70	Duke Conf. 173	A. Barbaro-Galtieri	(LRL) IJP
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BAILEY	69	Thesis UCRL 50617	J.M. Bailey	(LLL) IJP
ARMENTEROS	68B	NP B8 195	R. Armenteros *et al.*	(CERN, HEID, SACL) IJP