

$\Lambda(1810) P_{01}$ $I(J^P) = 0(\frac{1}{2}^+)$ Status: ***

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

 $\Lambda(1810)$ WIDTH

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

$\Lambda(1810)$ DECAY MODES

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

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$	Γ_1/Γ
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>
0.2 to 0.5 OUR ESTIMATE	
0.24 ± 0.04	GOPAL 80 DPWA $\bar{K}N \rightarrow \bar{K}N$
0.36 ± 0.05	LANGBEIN 72 IPWA $\bar{K}N$ 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 $\bar{K}N$ multichannel
0.30	KIM 71 DPWA K-matrix analysis
0.15	ARMENTEROS70 DPWA $\bar{K}N \rightarrow \bar{K}N$
0.55	BAILEY 69 DPWA $\bar{K}N \rightarrow \bar{K}N$
0.4	ARMENTEROS68B DPWA $\bar{K}N \rightarrow \bar{K}N$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1810) \rightarrow \Sigma\pi$	$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>
-0.24 ± 0.04	GOPAL 77 DPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •	
$+0.25$ or $+0.23$	¹ MARTIN 77 DPWA $\bar{K}N$ multichannel
< 0.01	LANGBEIN 72 IPWA $\bar{K}N$ multichannel
0.17	KIM 71 DPWA K-matrix analysis
$+0.20$	² ARMENTEROS70 DPWA $\bar{K}N \rightarrow \Sigma\pi$
-0.13 ± 0.03	BARBARO-... 70 DPWA $\bar{K}N \rightarrow \Sigma\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1810) \rightarrow \Sigma(1385)\pi$	$(\Gamma_1\Gamma_3)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>
$+0.18 \pm 0.10$	PREVOST 74 DPWA $K^-N \rightarrow \Sigma(1385)\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1810) \rightarrow N\bar{K}^*(892)$, $S=1/2$, P -wave	$(\Gamma_1\Gamma_5)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>
-0.14 ± 0.03	² CAMERON 78B DPWA $K^-p \rightarrow N\bar{K}^*$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1810) \rightarrow N\bar{K}^*(892), S=3/2, P\text{-wave}$	$(\Gamma_1 \Gamma_6)^{1/2} / \Gamma$
VALUE	DOCUMENT ID TECN COMMENT
+0.35 ± 0.06	CAMERON 78B DPWA $K^- p \rightarrow N\bar{K}^*$

$\Lambda(1810)$ 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.

$\Lambda(1810)$ REFERENCES

GOPAL	80	Toronto Conf. 159		(RHEL) 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
CARROLL	76	PRL 37 806	+Chiang, Kycia, Li, Mazur, Michael+	(BNL) I
PREVOST	74	NP B69 246	+Barloutaud+	(SACL, CERN, HEID)
LANGBEIN	72	NP B47 477	+Wagner	(MPIM) IJP
KIM	71	PRL 27 356		(HARV) IJP
Also	70	Duke Conf. 161	Kim	(HARV) IJP
ARMENTEROS	70	Duke Conf. 123	+Baillon+	(CERN, HEID, SACL) IJP
BARBARO-...	70	Duke Conf. 173	Barbaro-Galtieri	(LRL) IJP
BAILEY	69	Thesis UCRL 50617		(LLL) IJP
ARMENTEROS	68B	NP B8 195	+Baillon+	(CERN, HEID, SACL) IJP