

$\Lambda(1800) S_{01}$  $I(J^P) = 0(\frac{1}{2}^-)$  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
<b>1720 to 1850 (<math>\approx 1800</math>) OUR ESTIMATE</b>			
1841 $\pm$ 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1725 $\pm$ 20	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1825 $\pm$ 20	GOPAL	77	DPWA $\bar{K}N$ multichannel
1830 $\pm$ 20	LANGBEIN	72	IPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1767 or 1842	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
1780	KIM	71	DPWA K-matrix analysis
1872 $\pm$ 10	BRICMAN	70B	DPWA $\bar{K}N \rightarrow \bar{K}N$

 **$\Lambda(1800)$  WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>200 to 400 (<math>\approx 300</math>) OUR ESTIMATE</b>			
228 $\pm$ 20	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
185 $\pm$ 20	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
230 $\pm$ 20	GOPAL	77	DPWA $\bar{K}N$ multichannel
70 $\pm$ 15	LANGBEIN	72	IPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
435 or 473	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
40	KIM	71	DPWA K-matrix analysis
100 $\pm$ 20	BRICMAN	70B	DPWA $\bar{K}N \rightarrow \bar{K}N$

 **$\Lambda(1800)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	25–40 %
$\Gamma_2$ $\Sigma\pi$	seen
$\Gamma_3$ $\Sigma(1385)\pi$	seen
$\Gamma_4$ $N\bar{K}^*(892)$	seen
$\Gamma_5$ $N\bar{K}^*(892)$ , $S=1/2$ , $S$ -wave	
$\Gamma_6$ $N\bar{K}^*(892)$ , $S=3/2$ , $D$ -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  $\Lambda$  and  $\Sigma$  Resonances.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$				$\Gamma_1/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.25 to 0.40 OUR ESTIMATE</b>				
0.36±0.04	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$	
0.28±0.05	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$	
0.35±0.15	LANGBEIN	72	IPWA $\bar{K}N$ 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	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel	
0.80	KIM	71	DPWA K-matrix analysis	
0.18±0.02	BRICMAN	70B	DPWA $\bar{K}N \rightarrow \bar{K}N$	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1800) \rightarrow \Sigma\pi$				$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
-0.08±0.05	GOPAL	77	DPWA $\bar{K}N$ multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.74 or -0.43	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel	
0.24	KIM	71	DPWA K-matrix analysis	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1800) \rightarrow \Sigma(1385)\pi$				$(\Gamma_1\Gamma_3)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
+0.056±0.028	<sup>2</sup> CAMERON	78	DPWA $K^-p \rightarrow \Sigma(1385)\pi$	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1800) \rightarrow N\bar{K}^*(892), S=1/2, S\text{-wave}$				$(\Gamma_1\Gamma_5)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
-0.17±0.03	<sup>2</sup> CAMERON	78B	DPWA $K^-p \rightarrow N\bar{K}^*$	

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1800) \rightarrow N\bar{K}^*(892), S=3/2, D\text{-wave}$				$(\Gamma_1\Gamma_6)^{1/2}/\Gamma$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
-0.13±0.04	CAMERON	78B	DPWA $K^-p \rightarrow N\bar{K}^*$	

 **$\Lambda(1800)$  FOOTNOTES**

<sup>1</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

<sup>2</sup> The published sign has been changed to be in accord with the baryon-first convention.

### $\Lambda(1800)$ 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

---