

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

$I(J^P) = 0(\frac{1}{2}^-)$  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>			
$1845 \pm 10$	MANLEY	02	DPWA $\bar{K}N$ multichannel
$1841 \pm 10$	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>			
$518 \pm 84$	MANLEY	02	DPWA $\bar{K}N$ multichannel
$228 \pm 20$	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>				
0.24±0.10	MANLEY	02	DPWA $\bar{K}N$ multichannel	
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

MANLEY	02	PRL 88 012002	D.M. Manley <i>et al.</i>	(BNL Crystal Ball Collab.)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
ALSTON-...	78	PR D18 182	M. Alston-Garnjost <i>et al.</i>	(LBL, MTHO+) IJP
Also		PRL 38 1007	M. Alston-Garnjost <i>et al.</i>	(LBL, MTHO+) IJP
CAMERON	78	NP B143 189	W. Cameron <i>et al.</i>	(RHEL, LOIC) IJP
CAMERON	78B	NP B146 327	W. Cameron <i>et al.</i>	(RHEL, LOIC) IJP
GOPAL	77	NP B119 362	G.P. Gopal <i>et al.</i>	(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)
Also		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		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

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