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

$I(J^P) = 0(\frac{1}{2}^-)$  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 ($\approx$ 1800) OUR ESTIMATE** | | | | |
| $1845\pm10$ | MANLEY | 02 | DPWA | $\overline{K}N$ multichannel |
| $1841\pm10$ | GOPAL | 80 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $1725\pm20$ | ALSTON-... | 78 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $1825\pm20$ | GOPAL | 77 | DPWA | $\overline{K}N$ multichannel |
| $1830\pm20$ | 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 |
| $1872\pm10$ | BRICMAN | 70B | DPWA | $\overline{K}N \to \overline{K}N$ |

## $\Lambda(1800)$ WIDTH

| VALUE (MeV) | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **200 to 400 ($\approx$ 300) OUR ESTIMATE** | | | | |
| $518\pm84$ | MANLEY | 02 | DPWA | $\overline{K}N$ multichannel |
| $228\pm20$ | GOPAL | 80 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $185\pm20$ | ALSTON-... | 78 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $230\pm20$ | GOPAL | 77 | DPWA | $\overline{K}N$ multichannel |
| $70\pm15$ | 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 |
| $100\pm20$ | BRICMAN | 70B | DPWA | $\overline{K}N \to \overline{K}N$ |

## $\Lambda(1800)$ DECAY MODES

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

### $\Gamma(N\overline{K})/\Gamma_{\text{total}}$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $\Gamma_1/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.25 to 0.40 OUR ESTIMATE** | | | | |
| $0.24\pm0.10$ | MANLEY | 02 | DPWA | $\overline{K}N$ multichannel |
| $0.36\pm0.04$ | GOPAL | 80 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $0.28\pm0.05$ | ALSTON-... | 78 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $0.35\pm0.15$ | LANGBEIN | 72 | IPWA | $\overline{K}N$ multichannel |
| $\bullet\bullet\bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet\bullet\bullet$ | | | | |
| $0.37\pm0.05$ | 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 |
| $0.18\pm0.02$ | BRICMAN | 70B | DPWA | $\overline{K}N \to \overline{K}N$ |

### $(\Gamma_i\Gamma_f)^{\frac{1}{2}}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1800) \to \Sigma\pi$ $\qquad\qquad$ $(\Gamma_1\Gamma_2)^{\frac{1}{2}}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.08\pm0.05$ | GOPAL | 77 | DPWA | $\overline{K}N$ multichannel |
| $\bullet\bullet\bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet\bullet\bullet$ | | | | |
| $-0.74$ or $-0.43$ | [1] MARTIN | 77 | DPWA | $\overline{K}N$ multichannel |
| 0.24 | KIM | 71 | DPWA | K-matrix analysis |

### $(\Gamma_i\Gamma_f)^{\frac{1}{2}}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1800) \to \Sigma(1385)\pi$ $\qquad$ $(\Gamma_1\Gamma_3)^{\frac{1}{2}}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $+0.056\pm0.028$ | [2] CAMERON | 78 | DPWA | $K^- p \to \Sigma(1385)\pi$ |

### $(\Gamma_i\Gamma_f)^{\frac{1}{2}}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1800) \to N\overline{K}{}^*(892)$, $S=1/2$, $S$-wave $\quad (\Gamma_1\Gamma_5)^{\frac{1}{2}}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.17\pm0.03$ | [2] CAMERON | 78B | DPWA | $K^- p \to N\overline{K}{}^*$ |

### $(\Gamma_i\Gamma_f)^{\frac{1}{2}}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Lambda(1800) \to N\overline{K}{}^*(892)$, $S=3/2$, $D$-wave $\quad (\Gamma_1\Gamma_6)^{\frac{1}{2}}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.13\pm0.04$ | CAMERON | 78B | DPWA | $K^- p \to N\overline{K}{}^*$ |

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## $\Lambda(1800)$ 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.

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# Λ(1800) REFERENCES

| | | | | |
|---|---|---|---|---|
| MANLEY | 02 | PRL 88 012002 | D.M. Manley *et al.* | (BNL Crystal Ball Collab.) |
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| ALSTON-... | 78 | PR D18 182 | M. Alston-Garnjost *et al.* | (LBL, MTHO+) IJP |
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