# $\Lambda(1890)$ $P_{03}$

$I(J^P) = 0(\frac{3}{2}^+)$ Status: ****

For results published before 1974 (they are now obsolete), see our 1982 edition Physics Letters **111B** (1982).

The $J^P = 3/2^+$ assignment is consistent with all available data (including polarization) and recent partial-wave analyses. The dominant inelastic modes remain unknown.

## $\Lambda(1890)$ MASS

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **1850 to 1910 (≈ 1890) OUR ESTIMATE** | | | | |
| 1897± 5 | GOPAL | 80 | DPWA | $\overline{K}N \rightarrow \overline{K}N$ |
| 1908±10 | ALSTON-... | 78 | DPWA | $\overline{K}N \rightarrow \overline{K}N$ |
| 1900± 5 | GOPAL | 77 | DPWA | $\overline{K}N$ multichannel |
| 1894±10 | HEMINGWAY | 75 | DPWA | $K^-p \rightarrow \overline{K}N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 1856 or 1868 | [1] MARTIN | 77 | DPWA | $\overline{K}N$ multichannel |
| 1900 | [2] NAKKASYAN | 75 | DPWA | $K^-p \rightarrow \Lambda\omega$ |

## $\Lambda(1890)$ WIDTH

| *VALUE* (MeV) | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|
| **60 to 200 (≈ 100) OUR ESTIMATE** | | | | |
| 74±10 | GOPAL | 80 | DPWA | $\overline{K}N \rightarrow \overline{K}N$ |
| 119±20 | ALSTON-... | 78 | DPWA | $\overline{K}N \rightarrow \overline{K}N$ |
| 72±10 | GOPAL | 77 | DPWA | $\overline{K}N$ multichannel |
| 107±10 | HEMINGWAY | 75 | DPWA | $K^-p \rightarrow \overline{K}N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 191 or 193 | [1] MARTIN | 77 | DPWA | $\overline{K}N$ multichannel |
| 100 | [2] NAKKASYAN | 75 | DPWA | $K^-p \rightarrow \Lambda\omega$ |

## $\Lambda(1890)$ DECAY MODES

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $N\overline{K}$ | 20–35 % |
| $\Gamma_2$ | $\Sigma\pi$ | 3–10 % |
| $\Gamma_3$ | $\Sigma(1385)\pi$ | seen |
| $\Gamma_4$ | $\Sigma(1385)\pi$, $P$-wave | |
| $\Gamma_5$ | $\Sigma(1385)\pi$, $F$-wave | |
| $\Gamma_6$ | $N\overline{K}^*(892)$ | seen |
| $\Gamma_7$ | $N\overline{K}^*(892)$, $S$=1/2, $P$-wave | |
| $\Gamma_8$ | $\Lambda\omega$ | |

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

## $\Lambda(1890)$ BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on $\Lambda$ and $\Sigma$ Resonances.

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

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| **0.20 to 0.35 OUR ESTIMATE** | | | | |
| $0.20\pm0.02$ | GOPAL | 80 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $0.34\pm0.05$ | ALSTON-... | 78 | DPWA | $\overline{K}N \to \overline{K}N$ |
| $0.24\pm0.04$ | HEMINGWAY | 75 | DPWA | $K^-p \to \overline{K}N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $0.18\pm0.02$ | GOPAL | 77 | DPWA | See GOPAL 80 |
| 0.36 or 0.34 | [1] MARTIN | 77 | DPWA | $\overline{K}N$ multichannel |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1890) \to \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.09\pm0.03$ | GOPAL | 77 | DPWA | $\overline{K}N$ multichannel |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| $+0.15$ or $+0.14$ | [1] MARTIN | 77 | DPWA | $\overline{K}N$ multichannel |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1890) \to \Lambda\omega$ $(\Gamma_1\Gamma_8)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| seen | BACCARI | 77 | IPWA | $K^-p \to \Lambda\omega$ |
| 0.032 | [2] NAKKASYAN | 75 | DPWA | $K^-p \to \Lambda\omega$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1890) \to \Sigma(1385)\pi$, *P*-wave $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $<0.03$ | CAMERON | 78 | DPWA | $K^-p \to \Sigma(1385)\pi$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1890) \to \Sigma(1385)\pi$, *F*-wave $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.126\pm0.055$ | [3] CAMERON | 78 | DPWA | $K^-p \to \Sigma(1385)\pi$ |

### $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1890) \to N\overline{K}^*(892)$ $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| $-0.07\pm0.03$ | [3,4] CAMERON | 78B | DPWA | $K^-p \to N\overline{K}^*$ |

## $\Lambda(1890)$ FOOTNOTES

[1] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.
[2] Found in one of two best solutions.
[3] The published sign has been changed to be in accord with the baryon-first convention.
[4] Upper limits on the $P_3$ and $F_3$ waves are each 0.03.

## Λ(1890) REFERENCES


| | | | | | |
|---|---|---|---|---|---|
| PDG | 82 | PL 111B | Roos, Porter, Aguilar-Benitez+ | (HELS, CIT, CERN) | |
| 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 |
| BACCARI | 77 | NC 41A 96 | +Poulard, Revel, Tallini+ | (SACL, CDEF) | 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 |
| HEMINGWAY | 75 | NP B91 12 | +Eades, Harmsen+ | (CERN, HEIDH, MPIM) | IJP |
| NAKKASYAN | 75 | NP B93 85 | | (CERN) | IJP |