

$\Lambda(1830) \ 5/2^-$ $I(J^P) = 0(\frac{5}{2}^-)$ Status: ****

For results published before 1973 (they are now obsolete), see our 1982 edition *Physics Letters* **111B** 1 (1982).

The best evidence for this resonance is in the $\Sigma\pi$ channel.

 $\Lambda(1830)$ MASS

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|---------------------|-------------|--------------------------------------|
| 1810 to 1830 (≈ 1830) OUR ESTIMATE | | | |
| 1820 \pm 4 | ZHANG | 13A | DPWA Multichannel |
| 1831 \pm 10 | GOPAL | 80 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 1825 \pm 10 | GOPAL | 77 | DPWA $\bar{K}N$ multichannel |
| 1825 \pm 1 | KANE | 74 | DPWA $K^-p \rightarrow \Sigma\pi$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 1817 or 1818 | ¹ MARTIN | 77 | DPWA $\bar{K}N$ multichannel |

 $\Lambda(1830)$ WIDTH

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|---------------------|-------------|--------------------------------------|
| 60 to 110 (≈ 95) OUR ESTIMATE | | | |
| 114 \pm 10 | ZHANG | 13A | DPWA Multichannel |
| 100 \pm 10 | GOPAL | 80 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 94 \pm 10 | GOPAL | 77 | DPWA $\bar{K}N$ multichannel |
| 119 \pm 3 | KANE | 74 | DPWA $K^-p \rightarrow \Sigma\pi$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 56 or 56 | ¹ MARTIN | 77 | DPWA $\bar{K}N$ multichannel |

 $\Lambda(1830)$ POLE POSITION**REAL PART**

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|-------------------|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 1809 | ZHANG | 13A | DPWA Multichannel |

-2×IMAGINARY PART

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|--------------------|-------------|-------------------|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | |
| 109 | ZHANG | 13A | DPWA Multichannel |

$\Lambda(1830)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|--|--------------------------------|
| Γ_1 $N\bar{K}$ | 3–10 % |
| Γ_2 $\Sigma\pi$ | 35–75 % |
| Γ_3 $\Sigma(1385)\pi$ | >15 % |
| The above branching fractions are our estimates, not fits or averages. | |
| Γ_4 $\Sigma(1385)\pi$, D -wave | (52±6) % |
| Γ_5 $\Lambda\eta$ | |

 $\Lambda(1830)$ 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> |
|---|---------------------|-------------|--------------------------------------|
| 0.03 to 0.10 OUR ESTIMATE | | | |
| 0.041±0.005 | ZHANG | 13A | DPWA Multichannel |
| 0.08 ±0.03 | GOPAL | 80 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 0.02 ±0.02 | ALSTON-... | 78 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 0.04 ±0.03 | GOPAL | 77 | DPWA See GOPAL 80 |
| 0.04 or 0.04 | ¹ MARTIN | 77 | DPWA $\bar{K}N$ multichannel |

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|---|---------------------|-------------|-----------------------------------|
| −0.13±0.01 | ZHANG | 13A | DPWA Multichannel |
| −0.17±0.03 | GOPAL | 77 | DPWA $\bar{K}N$ multichannel |
| −0.15±0.01 | KANE | 74 | DPWA $K^-p \rightarrow \Sigma\pi$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| −0.17 or −0.17 | ¹ MARTIN | 77 | DPWA $\bar{K}N$ multichannel |

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma(1385)\pi$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------|----------------------|-------------|---|
| +0.141±0.014 | ² CAMERON | 78 | DPWA $K^-p \rightarrow \Sigma(1385)\pi$ |
| +0.13 ±0.03 | PREVOST | 74 | DPWA $K^-N \rightarrow \Sigma(1385)\pi$ |

 $\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_4/Γ

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|------------------|--------------------|-------------|-------------------|
| 0.52±0.06 | ZHANG | 13A | DPWA Multichannel |

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Lambda\eta$ $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------|--------------------|-------------|----------------|
| −0.044±0.020 | RADER | 73 | MPWA |

$\Lambda(1830)$ FOOTNOTES

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

²The CAMERON 78 upper limit on G-wave decay is 0.03. The published sign has been changed to be in accord with the baryon-first convention.

 $\Lambda(1830)$ REFERENCES

| | | | | |
|------------|-----|-------------------|---|---------------------|
| ZHANG | 13A | PR C88 035205 | H. Zhang <i>et al.</i> | (KSU) |
| PDG | 82 | PL 111B 1 | M. Roos <i>et al.</i> | (HELS, CIT, CERN) |
| 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 |
| 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 |
| KANE | 74 | LBL-2452 | D.F. Kane | (LBL) IJP |
| PREVOST | 74 | NP B69 246 | J. Prevost <i>et al.</i> | (SACL, CERN, HEID) |
| RADER | 73 | NC 16A 178 | R.K. Rader <i>et al.</i> | (SACL, HEID, CERN+) |
