

$\Sigma(1880) P_{11}$

$I(J^P) = 1(\frac{1}{2}^+)$ Status: **

OMITTED FROM SUMMARY TABLE

A P_{11} resonance is suggested by several partial-wave analyses, but with wide variations in the mass and other parameters. We list here all claims which lie well above the $P_{11} \Sigma(1770)$.

$\Sigma(1880)$ MASS

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|----------------------------|----------------------|-------------|--|
| ≈ 1880 OUR ESTIMATE | | | |
| 1826 ± 20 | GOPAL | 80 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 1870 ± 10 | CAMERON | 78B | DPWA $K^- p \rightarrow N\bar{K}^*$ |
| 1847 or 1863 | ¹ MARTIN | 77 | DPWA $\bar{K}N$ multichannel |
| 1960 ± 30 | ² BAILLON | 75 | IPWA $\bar{K}N \rightarrow \Lambda\pi$ |
| 1985 ± 50 | VANHORN | 75 | DPWA $K^- p \rightarrow \Lambda\pi^0$ |
| 1898 | ³ LEA | 73 | DPWA Multichannel K-matrix |
| ~ 1850 | ARMENTEROS70 | | IPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 1950 ± 50 | BARBARO-... | 70 | DPWA $K^- N \rightarrow \Lambda\pi$ |
| 1920 ± 30 | LITCHFIELD | 70 | DPWA $K^- N \rightarrow \Lambda\pi$ |
| 1850 | BAILEY | 69 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 1882 ± 40 | SMART | 68 | DPWA $K^- N \rightarrow \Lambda\pi$ |

$\Sigma(1880)$ WIDTH

| <u>VALUE (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|--------------------|----------------------|-------------|--|
| 86 ± 15 | GOPAL | 80 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 80 ± 10 | CAMERON | 78B | DPWA $K^- p \rightarrow N\bar{K}^*$ |
| 216 or 220 | ¹ MARTIN | 77 | DPWA $\bar{K}N$ multichannel |
| 260 ± 40 | ² BAILLON | 75 | IPWA $\bar{K}N \rightarrow \Lambda\pi$ |
| 220 ± 140 | VANHORN | 75 | DPWA $K^- p \rightarrow \Lambda\pi^0$ |
| 222 | ³ LEA | 73 | DPWA Multichannel K-matrix |
| ~ 30 | ARMENTEROS70 | | IPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 200 ± 50 | BARBARO-... | 70 | DPWA $K^- N \rightarrow \Lambda\pi$ |
| 170 ± 40 | LITCHFIELD | 70 | DPWA $K^- N \rightarrow \Lambda\pi$ |
| 200 | BAILEY | 69 | DPWA $\bar{K}N \rightarrow \bar{K}N$ |
| 222 ± 150 | SMART | 68 | DPWA $K^- N \rightarrow \Lambda\pi$ |

$\Sigma(1880)$ DECAY MODES

| Mode | |
|------------|-----------------------------------|
| Γ_1 | $N\bar{K}$ |
| Γ_2 | $\Lambda\pi$ |
| Γ_3 | $\Sigma\pi$ |
| Γ_4 | $N\bar{K}^*(892), S=1/2, P$ -wave |
| Γ_5 | $N\bar{K}^*(892), S=3/2, P$ -wave |

$\Sigma(1880)$ 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> | |
| 0.06±0.02 | GOPAL | 80 | DPWA | $\bar{K}N \rightarrow \bar{K}N$ |
| 0.27 or 0.27 | ¹ MARTIN | 77 | DPWA | $\bar{K}N$ multichannel |
| 0.31 | ³ LEA | 73 | DPWA | Multichannel K-matrix |
| 0.20 | ARMENTEROS70 | | IPWA | $\bar{K}N \rightarrow \bar{K}N$ |
| 0.22 | BAILEY | 69 | DPWA | $\bar{K}N \rightarrow \bar{K}N$ |

| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1880) \rightarrow \Lambda\pi$ | | | | $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$ |
|--|----------------------|-------------|----------------|-----------------------------------|
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| −0.24 or −0.24 | ¹ MARTIN | 77 | DPWA | $\bar{K}N$ multichannel |
| −0.12 ±0.02 | ² BAILLON | 75 | IPWA | $\bar{K}N \rightarrow \Lambda\pi$ |
| +0.05 +0.07 −0.02 | VANHORN | 75 | DPWA | $K^-p \rightarrow \Lambda\pi^0$ |
| −0.169±0.119 | DEVENISH | 74B | | Fixed- <i>t</i> dispersion rel. |
| −0.30 | ³ LEA | 73 | DPWA | Multichannel K-matrix |
| −0.09 ±0.04 | BARBARO-... | 70 | DPWA | $K^-N \rightarrow \Lambda\pi$ |
| −0.14 ±0.03 | LITCHFIELD | 70 | DPWA | $K^-N \rightarrow \Lambda\pi$ |
| −0.11 ±0.03 | SMART | 68 | DPWA | $K^-N \rightarrow \Lambda\pi$ |

| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1880) \rightarrow \Sigma\pi$ | | | | $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$ |
|---|---------------------|-------------|----------------|-----------------------------------|
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| +0.30 or +0.29 | ¹ MARTIN | 77 | DPWA | $\bar{K}N$ multichannel |
| not seen | ³ LEA | 73 | DPWA | Multichannel K-matrix |

| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1880) \rightarrow N\bar{K}^*(892)$, $S=1/2$, P -wave | | | | $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$ |
|---|----------------------|-------------|----------------|-----------------------------------|
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| −0.05±0.03 | ⁴ CAMERON | 78B | DPWA | $K^-p \rightarrow N\bar{K}^*$ |

| $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1880) \rightarrow N\bar{K}^*(892)$, $S=3/2$, P -wave | | | | $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$ |
|---|--------------------|-------------|----------------|-----------------------------------|
| <u>VALUE</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> | |
| +0.11±0.03 | CAMERON | 78B | DPWA | $K^-p \rightarrow N\bar{K}^*$ |

$\Sigma(1880)$ FOOTNOTES

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

² From solution 1 of BAILLON 75; not present in solution 2.

³ Only unconstrained states from table 1 of LEA 73 are listed.

⁴ The published sign has been changed to be in accord with the baryon-first convention.

Σ(1880) REFERENCES

| | | | | |
|--------------------------|-----|-------------------|---|------------------------------|
| GOPAL | 80 | Toronto Conf. 159 | G.P. Gopal | (RHEL) IJP |
| CAMERON | 78B | NP B146 327 | W. Cameron <i>et al.</i> | (RHEL, LOIC) 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 |
| BAILLON | 75 | NP B94 39 | P.H. Baillon, P.J. Litchfield | (CERN, RHEL) IJP |
| VANHORN | 75 | NP B87 145 | A.J. van Horn | (LBL) IJP |
| Also | | NP B87 157 | A.J. van Horn | (LBL) IJP |
| DEVENISH | 74B | NP B81 330 | R.C.E. Devenish, C.D. Froggatt, B.R. Martin | (DESY+) |
| LEA | 73 | NP B56 77 | A.T. Lea <i>et al.</i> | (RHEL, LOUC, GLAS, AARH) IJP |
| ARMENTEROS | 70 | Duke Conf. 123 | R. Armenteros <i>et al.</i> | (CERN, HEID, SACL) IJP |
| Hyperon Resonances, 1970 | | | | |
| BARBARO-... | 70 | Duke Conf. 173 | A. Barbaro-Galtieri | (LRL) IJP |
| Hyperon Resonances, 1970 | | | | |
| LITCHFIELD | 70 | NP B22 269 | P.J. Litchfield | (RHEL) IJP |
| BAILEY | 69 | Thesis UCRL 50617 | J.M. Bailey | (LL) IJP |
| SMART | 68 | PR 169 1330 | W.M. Smart | (LRL) IJP |
