

$\Sigma(1880) P_{11}$

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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>≈ 1880 OUR ESTIMATE</b>			
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	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
1960 ± 30	<sup>2</sup> BAILLON	75	IPWA $\bar{K}N \rightarrow \Lambda\pi$
1985 ± 50	VANHORN	75	DPWA $K^-p \rightarrow \Lambda\pi^0$
1898	<sup>3</sup> 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**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
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	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
260 ± 40	<sup>2</sup> BAILLON	75	IPWA $\bar{K}N \rightarrow \Lambda\pi$
220 ± 140	VANHORN	75	DPWA $K^-p \rightarrow \Lambda\pi^0$
222	<sup>3</sup> 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
$\Gamma_1$ $N\bar{K}$
$\Gamma_2$ $\Lambda\pi$
$\Gamma_3$ $\Sigma\pi$
$\Gamma_4$ $N\bar{K}^*(892)$ , $S=1/2$ , $P$ -wave
$\Gamma_5$ $N\bar{K}^*(892)$ , $S=3/2$ , $P$ -wave

## $\Sigma(1880)$ 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>	
0.06±0.02	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$	
0.27 or 0.27	<sup>1</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel	
0.31	<sup>3</sup> 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	<sup>1</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel	
−0.12 ±0.02	<sup>2</sup> BAILLON 75	IPWA	$\bar{K}N \rightarrow \Lambda\pi$	
+0.05 <sup>+0.07</sup> −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	<sup>3</sup> 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	<sup>1</sup> MARTIN 77	DPWA	$\bar{K}N$ multichannel	
not seen	<sup>3</sup> 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	<sup>4</sup> 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

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

<sup>2</sup> From solution 1 of BAILLON 75; not present in solution 2.

<sup>3</sup> Only unconstrained states from table 1 of LEA 73 are listed.

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

## $\Sigma(1880)$ 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	(LLL) IJP
SMART	68	PR 169	1330	W.M. Smart	(LRL) IJP

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