$\Sigma(1910)\ 3/2^-$

$I(J^P) = 1(\frac{3}{2}^-)$ Status: ∗∗∗

was $\Sigma(1940)$

For results published before 1974 (they are now obsolete), see our 1982 edition Physics Letters **111B** 1 (1982).

Not all analyses require this state. It is not required by the GOYAL 77 analysis of $K^- n \to (\Sigma\pi)^-$ nor by the GOPAL 80 analysis of $K^- n \to K^- n$. See also HEMINGWAY 75.

$\Sigma(1910)$ POLE RESIDUES

The normalized residue is the residue divided by $\Gamma_{pole}/2$.

Normalized residue in $N\overline{K} \to \Sigma(1910) \to N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.03±0.02	**−95 ± 60**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.16±0.04	**−160 ± 15**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to \Lambda\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.04±0.03	**25 ± 25**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to \Xi\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.01±0.01		SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to \Lambda(1520)\pi$, P-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.01±0.01		SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to \Lambda(1520)\pi$, F-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
∼ 0		SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to \Delta\overline{K}$, S-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.03±0.01	**120 ± 20**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to N\overline{K}^*(892)$, S=3/2, S-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.03±0.02	**20 ± 35**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to N\overline{K}^*(892)$, S=1/2, D-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.02±0.01		SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1910) \to N\overline{K}^*(892)$, S=3/2, D-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.01±0.01		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Σ(1910) MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1870 to 1950 (≈ 1910) OUR ESTIMATE				
1878±12	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1920±50	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1950±30	BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
1949^{+40}_{-60}	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
1935±80	KANE	74	DPWA	$K^- p \to \Sigma\pi$
1940±20	LITCHFIELD	74B	DPWA	$K^- p \to \Lambda(1520)\pi^0$
1950±20	LITCHFIELD	74C	DPWA	$K^- p \to \Delta(1232)\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1886 or 1893	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1940	DEBELLEFON	76	IPWA	$K^- p \to \Lambda\pi^0$, F_{17} wave

Σ(1910) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
150 to 300 (≈ 220) OUR ESTIMATE				
224±25	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
170±25	CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$
300±80	GOPAL	77	DPWA	$\overline{K}N$ multichannel
150±75	BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
160^{+70}_{-40}	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
330±80	KANE	74	DPWA	$K^- p \to \Sigma\pi$
60±20	LITCHFIELD	74B	DPWA	$K^- p \to \Lambda(1520)\pi^0$
70^{+30}_{-20}	LITCHFIELD	74C	DPWA	$K^- p \to \Delta(1232)\overline{K}$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
157 or 159	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel

Σ(1910) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	0.01 to 0.05 (≈ 0.02)
Γ_2	$\Lambda\pi$	(6 ± 4) %
Γ_3	$\Sigma\pi$	(86 ±21) %
Γ_4	ΞK	
Γ_5	$\Sigma(1385)\pi$	seen
Γ_6	$\Sigma(1385)\pi$, S-wave	
Γ_7	$\Lambda(1520)\pi$	seen

Γ_8	$\Lambda(1520)\pi$, P-wave	
Γ_9	$\Lambda(1520)\pi$, F-wave	
Γ_{10}	$\Delta(1232)\overline{K}$	(3.0 ± 1.0) %
Γ_{11}	$\Delta(1232)\overline{K}$, S-wave	
Γ_{12}	$\Delta(1232)\overline{K}$, D-wave	
Γ_{13}	$N\overline{K}^*(892)$	seen
Γ_{14}	$N\overline{K}^*(892)$, S=3/2, S-wave	
Γ_{15}	$N\overline{K}^*(892)$, S=1/2 , D-wave	(1.0 ± 1.0) %
Γ_{16}	$N\overline{K}^*(892)$, S=3/2 , D-wave	

Σ(1910) BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

$\Gamma(N\overline{K})/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.01 to 0.05 (≈ 0.02) OUR ESTIMATE				
0.03±0.02	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
<0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
0.14 or 0.13	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda\pi)/\Gamma_{total}$ — Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.06±0.04	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Sigma\pi)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.86±0.21	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Xi K)/\Gamma_{total}$ — Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
∼ 0	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda(1520)\pi, P\text{-wave})/\Gamma_{total}$ — Γ_8/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
∼ 0	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda(1520)\pi, F\text{-wave})/\Gamma_{total}$ — Γ_9/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
∼ 0	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Delta(1232)\overline{K})/\Gamma_{total}$ — Γ_{10}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.03±0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(N\overline{K}^*(892))/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.03±0.02	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma\big(N\overline{K}^*(892), S{=}1/2, D\text{-wave}\big)/\Gamma_{\text{total}}$ — Γ_{15}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.01±0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma\big(N\overline{K}^*(892), S{=}3/2, D\text{-wave}\big)/\Gamma_{\text{total}}$ — Γ_{16}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
~ 0	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Lambda\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.06 ± 0.03	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.04 ± 0.02	BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
$-0.05\ ^{+0.03}_{-0.02}$	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
-0.153 ± 0.070	DEVENISH	74B		Fixed-t dispersion rel.
• • • 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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Sigma\pi$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.08 ± 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.14 ± 0.04	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$+0.16$ or $+0.16$	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Sigma(1385)\pi$ — $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.066 \pm 0.025$	[2] CAMERON	78	DPWA	$K^- p \to \Sigma(1385)\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Lambda(1520)\pi$, P-wave — $(\Gamma_1\Gamma_8)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
< 0.03	CAMERON	77	DPWA	$K^- p \to \Lambda(1520)\pi^0$
-0.11 ± 0.04	LITCHFIELD	74B	DPWA	$K^- p \to \Lambda(1520)\pi^0$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Lambda(1520)\pi$, F-wave — $(\Gamma_1\Gamma_9)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
0.062 ± 0.021	CAMERON	77	DPWA	$K^- p \to \Lambda(1520)\pi^0$
-0.08 ± 0.04	LITCHFIELD	74B	DPWA	$K^- p \to \Lambda(1520)\pi^0$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Delta(1232)\overline{K}$, S-wave — $(\Gamma_1\Gamma_{11})^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.16 ± 0.05	LITCHFIELD	74C	DPWA	$K^- p \to \Delta(1232)\overline{K}$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1910) \to \Delta(1232)\overline{K}$, D-wave — $(\Gamma_1\Gamma_{12})^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.14 ± 0.05	LITCHFIELD	74C	DPWA	$K^- p \to \Delta(1232)\overline{K}$

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Sigma(1910) \to N\overline{K}^*(892)$ $(\Gamma_1\Gamma_{13})^{½}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.09 ± 0.02	[3] CAMERON	78B	DPWA	$K^- p \to N\overline{K}^*$

Σ(1910) 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.
[3] Upper limits on the D_1 and D_3 waves are each 0.03.

Σ(1910) REFERENCES

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev et al.	(BONN, PNPI)
PDG	82	PL 111B 1	M. Roos et al.	(HELS, CIT, CERN)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL)
CAMERON	78	NP B143 189	W. Cameron et al.	(RHEL, LOIC) IJP
CAMERON	78B	NP B146 327	W. Cameron et al.	(RHEL, LOIC) IJP
CAMERON	77	NP B131 399	W. Cameron et al.	(RHEL, LOIC) IJP
GOPAL	77	NP B119 362	G.P. Gopal et al.	(LOIC, RHEL) IJP
GOYAL	77	PR D16 2746	D.P. Goyal, A.V. Sodhi	(DELH)
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
DEBELLEFON	76	NP B109 129	A. de Bellefon, A. Berthon	(CDEF) IJP
BAILLON	75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHEL) IJP
HEMINGWAY	75	NP B91 12	R.J. Hemingway et al.	(CERN, HEIDH, MPIM) 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+)
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
LITCHFIELD	74B	NP B74 19	P.J. Litchfield et al.	(CERN, HEIDH) IJP
LITCHFIELD	74C	NP B74 39	P.J. Litchfield et al.	(CERN, HEIDH) IJP