$\Sigma(1770)$ $1/2^+$

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

OMITTED FROM SUMMARY TABLE

Evidence for this state now rests solely on solution 1 of BAILLON 75, (see the footnotes) but the $\Lambda\pi$ partial-wave amplitudes of this solution are in disagreement with amplitudes from most other $\Lambda\pi$ analyses. ZHANG 13A finds no evidence for this state.

$\Sigma(1770)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1706^{+67}_{-60}	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B Reports two poles at 1605^{+2}_{-4} and $2014^{+\ 6}_{-13}$ MeV.

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$101^{+158}_{-\ 84}$	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports two poles with $192^{+\ 2}_{-10}$ and $140^{+28}_{-\ 2}$ MeV width.

$\Sigma(1770)$ POLE RESIDUES

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

Normalized residue in $N\overline{K} \rightarrow \Sigma(1770) \rightarrow N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0268	91	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \rightarrow \Sigma(1770) \rightarrow \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.145	−171	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Sigma(1770) \to \Lambda\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.117	−76	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Sigma(1770) \to \Sigma(1385)\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0722	−128	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Σ(1770) MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
≈ 1770 OUR ESTIMATE				
1738±10	[1] GOPAL	77	DPWA	$\overline{K}N$ multichannel
1770±20	[2] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
1772	[3] KANE	72	DPWA	$K^- p \to \Sigma\pi$

[1] Required to fit the isospin-1 total cross section of CARROLL 76 in the $\overline{K}N$ channel. The addition of new $K^- p$ polarization and $K^- n$ differential cross-section data in GOPAL 80 find it to be more consistent with the $\Sigma(1660)$ P_{11}.

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

[3] Not required in KANE 74, which supersedes KANE 72.

Σ(1770) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
72±10	[1] GOPAL	77	DPWA	$\overline{K}N$ multichannel
80±30	[2] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
80	[3] KANE	72	DPWA	$K^- p \to \Sigma\pi$

[1] Required to fit the isospin-1 total cross section of CARROLL 76 in the $\overline{K}N$ channel. The addition of new $K^- p$ polarization and $K^- n$ differential cross-section data in GOPAL 80 find it to be more consistent with the $\Sigma(1660)$ P_{11}.

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

[3] Not required in KANE 74, which supersedes KANE 72.

Σ(1770) DECAY MODES

	Mode
Γ_1	$N\overline{K}$
Γ_2	$\Lambda\pi$
Γ_3	$\Sigma\pi$
Γ_4	$\Sigma(1385)\pi$
Γ_5	$N\overline{K}^*(892)$, S=1/2, P-wave
Γ_6	$N\overline{K}^*(892)$, S=3/2, P-wave

$\Sigma(1770)$ 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
0.14 ±0.04	[1] GOPAL	77	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.016	[2] KAMANO	15	DPWA	Multichannel

[1] Required to fit the isospin-1 total cross section of CARROLL 76 in the $\overline{K}N$ channel. The addition of new K^-p polarization and K^-n differential cross-section data in GOPAL 80 find it to be more consistent with the $\Sigma(1660)$ P_{11}.

[2] From the preferred solution A in KAMANO 15.

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.283	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.595	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$ — Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.103	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$\Gamma(N\overline{K}^*(892), S{=}1/2, P\text{-wave})/\Gamma_{total}$ — Γ_5/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.004	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$\Gamma(N\overline{K}^*(892), S{=}3/2, P\text{-wave})/\Gamma_{total}$ — Γ_6/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Sigma(1770) \rightarrow \Lambda\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$<$ 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.08 ± 0.02	[1] BAILLON	75	IPWA	$\overline{K}N \rightarrow \Lambda\pi$

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Sigma(1770) \rightarrow \Sigma\pi$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$<$ 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.108	[1] KANE	72	DPWA	$K^- p \rightarrow \Sigma\pi$

[1] Not required in KANE 74, which supersedes KANE 72.

Σ(1770) REFERENCES

KAMANO	15	PR C92 025205	H. Kamano *et al.*	(ANL, OSAK)
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL)
GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(LOIC, RHEL) IJP
CARROLL	76	PRL 37 806	A.S. Carroll *et al.*	(BNL) I
BAILLON	75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHEL) IJP
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
KANE	72	PR D5 1583	D.F.J. Kane	(LBL)