$\Sigma(1750)$ REFERENCES

PDG	82	PL 111B	Roos, Porter, Aguilar-Benitez+	(HELS, CIT, CERN)
GOPAL	80	Toronto Conf. 159		(RHEL) IJP
ALSTON-...	78	PR D18 182	Alston-Garnjost, Kenney+	(LBL, MTHO, CERN) IJP
Also	77	PRL 38 1007	Alston-Garnjost, Kenney+	(LBL, MTHO, CERN) IJP
CAMERON	77	NP B131 399	+Franek, Gopal, Kalmus, McPherson+	(RHEL, LOIC) IJP
GOPAL	77	NP B119 362	+Ross, VanHorn, McPherson+	(LOIC, RHEL) IJP
MARTIN	77	NP B127 349	+Pidcock, Moorhouse	(LOUC, GLAS) IJP
Also	77B	NP B126 266	Martin, Pidcock	(LOUC)
Also	77C	NP B126 285	Martin, Pidcock	(LOUC) IJP
CARROLL	76	PRL 37 806	+Chiang, Kycia, Li, Mazur, Michael+	(BNL) I
DEBELLEFON	76	NP B109 129	De Bellefon, Berthon	(CDEF) IJP
BAILLON	75	NP B94 39	+Litchfield	(CERN, RHEL) IJP
VANHORN	75	NP B87 145		(LBL) IJP
Also	75B	NP B87 157	VanHorn	(LBL) IJP
CHU	74	NC 20A 35	+Bartley+	(PLAT, TUFTS, BRAN) IJP
DEVENISH	74B	NP B81 330	+Froggatt, Martin	(DESY, NORD, LOUC)
JONES	74	NP B73 141		(CHIC) IJP
PREVOST	74	NP B69 246	+Barloutaud+	(SACL, CERN, HEID)
LANGBEIN	72	NP B47 477	+Wagner	(MPIM) IJP
CLINE	69	LNC 2 407	+Laumann, Mapp	(WISC)

$\Sigma(1770)$ P_{11}

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

$\Sigma(1770)$ 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	$K^- p \to \Sigma\pi$

$\Sigma(1770)$ 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	$K^- p \to \Sigma\pi$

$\Sigma(1770)$ DECAY MODES

	Mode
Γ_1	$N\overline{K}$
Γ_2	$\Lambda\pi$
Γ_3	$\Sigma\pi$

$\Sigma(1770)$ BRANCHING RATIOS

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.14±0.04	[1] GOPAL	77	DPWA	$\overline{K}N$ multichannel

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

VALUE	DOCUMENT ID		TECN	COMMENT
$<$ 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
$-$0.08±0.02	[2] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$

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

VALUE	DOCUMENT ID		TECN	COMMENT
$<$ 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
$-$0.108	[3] KANE	72	DPWA	$K^- p \to \Sigma\pi$

$\Sigma(1770)$ FOOTNOTES

[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.

$\Sigma(1770)$ REFERENCES

GOPAL	80	Toronto Conf. 159		(RHEL)
GOPAL	77	NP B119 362	+Ross, VanHorn, McPherson+	(LOIC, RHEL) IJP
CARROLL	76	PRL 37 806	+Chiang, Kycia, Li, Mazur, Michael+	(BNL) I
BAILLON	75	NP B94 39	+Litchfield	(CERN, RHEL) IJP
KANE	74	LBL-2452		(LBL) IJP
KANE	72	PR D5 1583		(LBL)

$\Sigma(1775)$ D_{15}

$I(J^P) = 1(\frac{5}{2}^-)$ Status: $****$

Discovered by GALTIERI 63, this resonance plays the same role as cornerstone for isospin-1 analyses in this region as the $\Lambda(1820)$ does in the isospin-0 channel.

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

$\Sigma(1775)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1770 to 1780 (≈ 1775) OUR ESTIMATE				
1778± 5	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1777± 5	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
1774± 5	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1775±10	BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
1774±10	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
1772± 6	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1772 or 1777	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1765	DEBELLEFON	76	IPWA	$K^- p \to \Lambda\pi^0$

$\Sigma(1775)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
105 to 135 (≈ 120) OUR ESTIMATE				
137±10	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
116±10	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
130±10	GOPAL	77	DPWA	$\overline{K}N$ multichannel
125±15	BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
146±18	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
154±10	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
102 or 103	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
120	DEBELLEFON	76	IPWA	$K^- p \to \Lambda\pi^0$

$\Sigma(1775)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	37–43%
Γ_2	$\Lambda\pi$	14–20%
Γ_3	$\Sigma\pi$	2–5%
Γ_4	$\Sigma(1385)\pi$	8–12%
Γ_5	$\Sigma(1385)\pi$, D-wave	
Γ_6	$\Lambda(1520)\pi$	17–23%
Γ_7	$\Sigma\pi\pi$	

The above branching fractions are our estimates, not fits or averages.

CONSTRAINED FIT INFORMATION

An overall fit to 8 branching ratios uses 16 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 = 63.9$ for 12 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle\delta x_i \delta x_j\right\rangle/(\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	-30			
x_3	-17	-21		
x_4	-37	-49	-14	
x_6	-81	6	8	16
	x_1	x_2	x_3	x_4

$\Sigma(1775)$ BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances. Also, the errors quoted do not include uncertainties due to the parametrization used in the partial-wave analyses and are thus too small.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.37 to 0.43 OUR ESTIMATE				
0.45 ±0.04 OUR FIT Error includes scale factor of 3.1.				
0.391±0.017 OUR AVERAGE				
0.40 ±0.02	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.37 ±0.03	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.41 ±0.03	GOPAL	77	DPWA	See GOPAL 80
0.37 or 0.36	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel