NODE=B000

$\Sigma(1580)\ 3/2^-$

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

OMITTED FROM SUMMARY TABLE

Seen in the isospin-1 $\overline{K}N$ cross section at BNL (LI 73, CARROLL 76) and in a partial-wave analysis of $K^- p \to \Lambda\pi^0$ for c.m. energies 1560–1600 MeV by LITCHFIELD 74. LITCHFIELD 74 finds $J^P = 3/2^-$. Not seen by ENGLER 78, CAMERON 78C, OLMSTED 04, nor by PRAKHOV 04.

NODE=B000

Neither ZHANG 13A nor SARANTSEV 19 see any evidence for this state.

Σ(1580) POLE POSITION

NODE=B000225

REAL PART

NODE=B000RE
NODE=B000RE

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1607^{+13}_{-11}	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports M = 1492^{+4}_{-7} MeV.

NODE=B000RE;LINKAGE=A

−2×IMAGINARY PART

NODE=B000IM
NODE=B000IM

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
253^{+30}_{-18}	[2] KAMANO	15	DPWA	Multichannel

[2] From the preferred solution A in KAMANO 15. Solution B reports M = 138^{+8}_{-14} MeV.

NODE=B000IM;LINKAGE=A

Σ(1580) POLE RESIDUES

NODE=B000250

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

NODE=B000250

Normalized residue in $N\overline{K} \to \Sigma(1580) \to N\overline{K}$

NODE=B000A00
NODE=B000A00

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00778	51	[3] KAMANO	15	DPWA	Multichannel

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

NODE=B000A00;LINKAGE=A

Normalized residue in $N\overline{K} \to \Sigma(1580) \to \Sigma\pi$

NODE=B000A01
NODE=B000A01

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0625	−6	[4] KAMANO	15	DPWA	Multichannel

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

NODE=B000A01;LINKAGE=A

Normalized residue in $N\overline{K} \to \Sigma(1580) \to \Lambda\pi$

NODE=B000A02
NODE=B000A02

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.059	156	[5] KAMANO	15	DPWA	Multichannel

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

NODE=B000A02;LINKAGE=A

Normalized residue in $N\overline{K} \to \Sigma(1580) \to \Sigma(1385)\pi$, S-wave

NODE=B000A05
NODE=B000A05

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0368	−18	[6] KAMANO	15	DPWA	Multichannel

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

NODE=B000A05;LINKAGE=A

Normalized residue in $N\overline{K} \to \Sigma(1580) \to \Sigma(1385)\pi$, D-wave

NODE=B000A06

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0103	123	[7] KAMANO	15	DPWA	Multichannel

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

NODE=B000A06;LINKAGE=A

Σ(1580) MASS

NODE=B000M

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
≈ 1580 OUR ESTIMATE				
1583±4	[8] CARROLL	76	DPWA	Isospin-1 total σ
1582±4	[9] LITCHFIELD	74	DPWA	$K^- p \to \Lambda\pi^0$

→ UNCHECKED ←

[8] CARROLL 76 sees a total-cross-section bump with $(J+1/2)\ \Gamma_{el}\ /\ \Gamma_{total} = 0.06$.

[9] The main effect observed by LITCHFIELD 74 is in the $\Lambda\pi$ final state; the $\overline{K}N$ and $\Sigma\pi$ couplings are estimated from a multichannel fit including total-cross-section data of LI 73.

NODE=B000;LINKAGE=B
NODE=B000M;LINKAGE=A

Σ(1580) WIDTH

NODE=B000W

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
15	[10] CARROLL	76	DPWA	Isospin-1 total σ
11±4	[11] LITCHFIELD	74	DPWA	$K^- p \to \Lambda\pi^0$

[10] CARROLL 76 sees a total-cross-section bump with $(J+1/2)\ \Gamma_{el}\ /\ \Gamma_{total} = 0.06$.

[11] The main effect observed by LITCHFIELD 74 is in the $\Lambda\pi$ final state; the $\overline{K}N$ and $\Sigma\pi$ couplings are estimated from a multichannel fit including total-cross-section data of LI 73.

NODE=B000W;LINKAGE=B
NODE=B000W;LINKAGE=A

Σ(1580) DECAY MODES

NODE=B000215;NODE=B000

	Mode	
Γ_1	$N\overline{K}$	DESIG=1
Γ_2	$\Lambda\pi$	DESIG=2
Γ_3	$\Sigma\pi$	DESIG=3
Γ_4	$\Sigma(1385)\pi$, S-wave	DESIG=4
Γ_5	$\Sigma(1385)\pi$, D-wave	DESIG=5
Γ_6	$N\overline{K}^*(892)$, S=1/2, D-wave	DESIG=6
Γ_7	$N\overline{K}^*(892)$, S=3/2, S-wave	DESIG=7
Γ_8	$N\overline{K}^*(892)$, S=3/2, D-wave	DESIG=8

Σ(1580) BRANCHING RATIOS

NODE=B000220

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

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

NODE=B000R1

VALUE	DOCUMENT ID		TECN	COMMENT
+0.03 ±0.01	[12] LITCHFIELD	74	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.003	[13] KAMANO	15	DPWA	Multichannel

OCCUR=2

[12] The main effect observed by LITCHFIELD 74 is in the $\Lambda\pi$ final state; the $\overline{K}N$ and $\Sigma\pi$ couplings are estimated from a multichannel fit including total-cross-section data of LI 73.

NODE=B000;LINKAGE=A

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

NODE=B000R1;LINKAGE=A

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

NODE=B000R01

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.490	[14] KAMANO	15	DPWA	Multichannel

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

NODE=B000R01;LINKAGE=A

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

NODE=B000R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.387	[15] KAMANO	15	DPWA	Multichannel

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

NODE=B000R00;LINKAGE=A

$\Gamma(\Sigma(1385)\pi\,,\, S\text{-wave})/\Gamma_{total}$ — Γ_4/Γ

NODE=B000R02

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.12	[16] KAMANO	15	DPWA	Multichannel

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

NODE=B000R02;LINKAGE=A

$\Gamma(\Sigma(1385)\pi\,,\, D\text{-wave})/\Gamma_{total}$ — Γ_5/Γ

NODE=B000R03

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.001	[17] KAMANO	15	DPWA	Multichannel

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

NODE=B000R03;LINKAGE=A

$\Gamma(N\overline{K}^*(892)\,,\, S{=}1/2,\, D\text{-wave})/\Gamma_{total}$ — Γ_6/Γ

NODE=B000R04

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[18] KAMANO	15	DPWA	Multichannel

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

NODE=B000R04;LINKAGE=A

$\Gamma(N\overline{K}^*(892)\,,\, S{=}3/2,\, S\text{-wave})/\Gamma_{total}$ — Γ_7/Γ

NODE=B000R05

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[19] KAMANO	15	DPWA	Multichannel

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

NODE=B000R05;LINKAGE=A

$\Gamma(N\overline{K}^*(892)\,,\, S{=}3/2,\, D\text{-wave})/\Gamma_{total}$ — Γ_8/Γ

NODE=B000R06

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[20] KAMANO	15	DPWA	Multichannel

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

NODE=B000R06;LINKAGE=A

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Sigma(1580) \to \Lambda\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

NODE=B000R2

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CAMERON	78C	HBC	$K^0_L p \to \Lambda\pi^+$
not seen	ENGLER	78	HBC	$K^0_L p \to \Lambda\pi^+$
$+0.10\pm0.02$	[21] LITCHFIELD	74	DPWA	$K^- p \to \Lambda\pi^0$

[21] The main effect observed by LITCHFIELD 74 is in the $\Lambda\pi$ final state; the $\overline{K}N$ and $\Sigma\pi$ couplings are estimated from a multichannel fit including total-cross-section data of LI 73.

NODE=B000R2;LINKAGE=A

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Sigma(1580) \to \Sigma\pi$ — $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B000R3

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	CAMERON	78C	HBC	$K^0_L p \to \Sigma^0\pi^+$
not seen	ENGLER	78	HBC	$K^0_L p \to \Sigma^0\pi^+$
$+0.03\pm0.04$	[22] LITCHFIELD	74	DPWA	$\overline{K}N$ multichannel

[22] The main effect observed by LITCHFIELD 74 is in the $\Lambda\pi$ final state; the $\overline{K}N$ and $\Sigma\pi$ couplings are estimated from a multichannel fit including total-cross-section data of LI 73.

NODE=B000R3;LINKAGE=A

$\Sigma(1580)$ REFERENCES

NODE=B000

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=59986
KAMANO	15	PR C92 025205	H. Kamano *et al.*	(ANL, OSAK)	REFID=57507
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)	REFID=55441
OLMSTED	04	PL B588 29	J. Olmsted *et al.*	(BNL Crystal Ball Collab.)	REFID=49899
PRAKHOV	04	PR C69 042202	S. Prakhov *et al.*	(BNL Crystal Ball Collab.)	REFID=49948
CAMERON	78C	NP B132 189	W. Cameron *et al.*	(BGNA, EDIN, GLAS+) I	REFID=31555
ENGLER	78	PR D18 3061	A. Engler *et al.*	(CMU, ANL)	REFID=31556
CARROLL	76	PRL 37 806	A.S. Carroll *et al.*	(BNL) I	REFID=31760
LITCHFIELD	74	PL 51B 509	P.J. Litchfield	(CERN) IJP	REFID=32078
LI	73	Purdue Conf. 283	K.K. Li	(BNL) I	REFID=32084