NODE=B079

$\Sigma(1660)\ 1/2^+$

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

NODE=B079

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

Σ(1660) POLE POSITION

NODE=B079225

REAL PART

NODE=B079RE
NODE=B079RE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1585± 20	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1547^{+111}_{-59}	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports M = 1457^{+5}_{-1} MeV.

NODE=B079RE;LINKAGE=A

−2×IMAGINARY PART

NODE=B079IM
NODE=B079IM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{290^{+140}_{-40}}$	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
183^{+86}_{-78}	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports Γ = 78^{+2}_{-8} MeV.

NODE=B079IM;LINKAGE=A

Σ(1660) POLE RESIDUES

NODE=B079250

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

NODE=B079250

Normalized residue in $N\overline{K} \rightarrow \Sigma(1660) \rightarrow N\overline{K}$

NODE=B079A00
NODE=B079A00

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.07 ±0.03	**−165 ± 35**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0247	168	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

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

NODE=B079A00;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Sigma(1660) \rightarrow \Sigma\pi$

NODE=B079A01
NODE=B079A01

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.17±0.04	**150 ± 20**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.16	78	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

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

NODE=B079A01;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Sigma(1660) \rightarrow \Lambda\pi$

NODE=B079A02
NODE=B079A02

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.16 ±0.05	**0 ± 25**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0614	−84	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

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

NODE=B079A02;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Sigma(1660) \rightarrow \Sigma\sigma$

NODE=B079A04
NODE=B079A04

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.14±0.06	**−150 ± 30**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1660) \rightarrow \Sigma(1385)\pi$

NODE=B079A03
NODE=B079A03

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0513	−44	[1] KAMANO	15	DPWA	Multichannel

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

NODE=B079A03;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Sigma(1660) \rightarrow \Lambda(1405)\pi$

NODE=B079A05
NODE=B079A05

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.06±0.03	**−90 ± 25**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Sigma(1660) \to \Lambda(1520)\pi$

NODE=B079A06
NODE=B079A06

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.04±0.02	**5 ± 20**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Σ(1660) MASS

NODE=B079M

NODE=B079M

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1640 to 1680 (≈ 1660) OUR ESTIMATE				
1643.2± 4.5±7.6	ABLIKIM	25AF	BES3	$\psi(3686) \to \Lambda\overline{\Sigma}^0\pi^0$ + c.c. (PWA)
1665 ±20	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1633 ± 3	GAO	12	DPWA	$\overline{K}N \to \Lambda\pi$
1665.1±11.2	[1] KOISO	85	DPWA	$K^- p \to \Sigma\pi$
1670 ±10	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1679 ±10	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
1668 ±25	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
1670 ±20	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1676 ±15	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1565 or 1597	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1660 ±30	[3] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
1671 ± 2	[4] PONTE	75	DPWA	$K^- p \to \Lambda\pi^0$

[1] The evidence of KOISO 85 is weak. NODE=B079M;LINKAGE=D
[2] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. NODE=B079M;LINKAGE=C
[3] From solution 1 of BAILLON 75; not present in solution 2. NODE=B079M;LINKAGE=A
[4] From solution 2 of PONTE 75; not present in solution 1. NODE=B079M;LINKAGE=B

Σ(1660) WIDTH

NODE=B079W

NODE=B079W

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
100 to 300 (≈ 200) OUR ESTIMATE				
221.3± 13.1±41.1	ABLIKIM	25AF	BES3	$\psi(3686) \to \Lambda\overline{\Sigma}^0\pi^0$ + c.c. (PWA)
$300\ ^{+140}_{-\ 40}$	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
$121\ ^{+4}_{-7}$	GAO	12	DPWA	$\overline{K}N \to \Lambda\pi$
81.5± 22.2	[1] KOISO	85	DPWA	$K^- p \to \Sigma\pi$
152 ± 20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
38 ± 10	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
$230\ ^{+165}_{-\ 60}$	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
250 ±110	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
120 ± 20	GOPAL	77	DPWA	$\overline{K}N$ multichannel
202 or 217	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel
80 ± 40	[3] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
81 ± 10	[4] PONTE	75	DPWA	$K^- p \to \Lambda\pi^0$

[1] The evidence of KOISO 85 is weak. NODE=B079W;LINKAGE=D
[2] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. NODE=B079W;LINKAGE=C
[3] From solution 1 of BAILLON 75; not present in solution 2. NODE=B079W;LINKAGE=A
[4] From solution 2 of PONTE 75; not present in solution 1. NODE=B079W;LINKAGE=B

Σ(1660) DECAY MODES

NODE=B079215;NODE=B079

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\overline{K}$	0.05 to 0.15 (≈ 0.10)	DESIG=1
Γ_2	$\Lambda\pi$	(35 ±12) %	DESIG=3
Γ_3	$\Sigma\pi$	(37 ±10) %	DESIG=2
Γ_4	$\Sigma\sigma$	(20 ± 8) %	DESIG=5
Γ_5	$\Sigma(1385)\pi$		DESIG=4
Γ_6	$\Lambda(1405)\pi$	(4.0 ± 2.0) %	DESIG=6
Γ_7	$\Lambda(1520)\pi$		DESIG=7

$\Sigma(1660)$ BRANCHING RATIOS

NODE=B079220

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

NODE=B079220

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

NODE=B079R2
NODE=B079R2

VALUE	DOCUMENT ID		TECN	COMMENT
0.05 to 0.15 (≈ 0.10) OUR ESTIMATE				
0.07 ±0.03	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.12 ±0.03	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.10 ±0.05	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.005	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
<0.04	GOPAL	77	DPWA	See GOPAL 80
0.27 or 0.29	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel

→ UNCHECKED ←

[1] From the preferred solution A in KAMANO 15.
NODE=B079R2;LINKAGE=A

[2] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.
NODE=B079;LINKAGE=C

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

NODE=B079R01
NODE=B079R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.35 ±0.12	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.128	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.
NODE=B079R01;LINKAGE=A

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

NODE=B079R00
NODE=B079R00

VALUE	DOCUMENT ID		TECN	COMMENT
0.37 ±0.10	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.865	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.
NODE=B079R00;LINKAGE=A

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

NODE=B079R03
NODE=B079R03

VALUE	DOCUMENT ID		TECN	COMMENT
0.20±0.08	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$ — Γ_5/Γ

NODE=B079R02
NODE=B079R02

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.001	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.
NODE=B079R02;LINKAGE=A

$\Gamma(\Lambda(1405)\pi)/\Gamma_{total}$ — Γ_6/Γ

NODE=B079R04
NODE=B079R04

VALUE	DOCUMENT ID		TECN	COMMENT
0.04±0.02	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda(1520)\pi)/\Gamma_{total}$ — Γ_7/Γ

NODE=B079R05
NODE=B079R05

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

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Sigma(1660) \to \Lambda\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

NODE=B079R3
NODE=B079R3

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.064^{+0.005}_{-0.003}$	GAO	12	DPWA	$\overline{K}N \to \Lambda\pi$
< 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
$0.12^{+0.12}_{-0.04}$	VANHORN	75	DPWA	$K^- p \to \Lambda\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.10 or −0.11	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
−0.04 ±0.02	[2] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
+0.16 ±0.01	[3] PONTE	75	DPWA	$K^- p \to \Lambda\pi^0$

[1] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.
NODE=B079R3;LINKAGE=C

[2] From solution 1 of BAILLON 75; not present in solution 2.
NODE=B079;LINKAGE=A

[3] From solution 2 of PONTE 75; not present in solution 1.
NODE=B079R3;LINKAGE=B

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Sigma(1660) \to \Sigma\pi$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B079R1
NODE=B079R1

VALUE	DOCUMENT ID		TECN	COMMENT
-0.13 ± 0.04	[1] KOISO	85	DPWA	$K^- p \to \Sigma\pi$
-0.16 ± 0.03	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.11 ± 0.01	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.34 or -0.37	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel
not seen	HEPP	76B	DPWA	$K^- N \to \Sigma\pi$

[1] The evidence of KOISO 85 is weak.
[2] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

NODE=B079;LINKAGE=D
NODE=B079R1;LINKAGE=C

Σ(1660) REFERENCES

NODE=B079

ABLIKIM	25AF	JHEP 2502 212	M. Ablikim *et al.*	(BESIII Collab.)	REFID=63277
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
GAO	12	PR C86 025201	P. Gao, J. Shi, B.S. Zou	(BHEP, BEIJT)	REFID=54341
Also		NP A867 41	P. Gao, B.S. Zou, A. Sibirtsev	(BHEP, BEIJT+)	REFID=53734
KOISO	85	NP A433 619	H. Koiso *et al.*	(TOKY, MASA)	REFID=31795
PDG	82	PL 111B 1	M. Roos *et al.*	(HELS, CIT, CERN)	REFID=41167
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP	REFID=31755
ALSTON-...	78	PR D18 182	M. Alston-Garnjost *et al.*	(LBL, MTHO+) IJP	REFID=31751
Also		PRL 38 1007	M. Alston-Garnjost *et al.*	(LBL, MTHO+) IJP	REFID=31752
GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(LOIC, RHEL) IJP	REFID=31750
MARTIN	77	NP B127 349	B.R. Martin, M.K. Pidcock, R.G. Moorhouse	(LOUC+) IJP	REFID=31762
Also		NP B126 266	B.R. Martin, M.K. Pidcock	(LOUC)	REFID=31763
Also		NP B126 285	B.R. Martin, M.K. Pidcock	(LOUC) IJP	REFID=31764
HEPP	76B	PL 65B 487	V. Hepp *et al.*	(CERN, HEIDH, MPIM) IJP	REFID=31761
BAILLON	75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHEL) IJP	REFID=32089
PONTE	75	PR D12 2597	R.A. Ponte *et al.*	(MASA, TENN, UCR) IJP	REFID=32114
VANHORN	75	NP B87 145	A.J. van Horn	(LBL) IJP	REFID=32093
Also		NP B87 157	A.J. van Horn	(LBL) IJP	REFID=32094
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP	REFID=31759