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

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

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

Σ(1660) MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1630 to 1690 (≈ 1660) OUR ESTIMATE				
1633 ± 3	GAO	12	DPWA	$\overline{K}N \rightarrow \Lambda\pi$
1665.1±11.2	[1] KOISO	85	DPWA	$K^- p \rightarrow \Sigma\pi$
1670 ±10	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1679 ±10	ALSTON-...	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
1676 ±15	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1668 ±25	VANHORN	75	DPWA	$K^- p \rightarrow \Lambda\pi^0$
1670 ±20	KANE	74	DPWA	$K^- p \rightarrow \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1565 or 1597	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1660 ±30	[3] BAILLON	75	IPWA	$\overline{K}N \rightarrow \Lambda\pi$
1671 ± 2	[4] PONTE	75	DPWA	$K^- p \rightarrow \Lambda\pi^0$

Σ(1660) WIDTH

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

Σ(1660) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	10–30 %
Γ_2	$\Lambda\pi$	seen
Γ_3	$\Sigma\pi$	seen

$\Sigma(1660)$ 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
0.1 to 0.3 OUR ESTIMATE				
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. • • •				
<0.04	GOPAL	77	DPWA	See GOPAL 80
0.27 or 0.29	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel

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

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	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel
-0.04 ± 0.02	[3] BAILLON	75	IPWA	$\overline{K}N \to \Lambda\pi$
$+0.16\pm0.01$	[4] PONTE	75	DPWA	$K^-p \to \Lambda\pi^0$

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

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	$K^-N \to \Sigma\pi$

$\Sigma(1660)$ FOOTNOTES

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

$\Sigma(1660)$ REFERENCES

GAO	12	PR C86 025201	P. Gao, J. Shi, B.S. Zou	(BHEP, BEIJT)
Also		NP A867 41	P. Gao, B.S. Zou, A. Sibirtsev	(BHEP, BEIJT+)
KOISO	85	NP A433 619	H. Koiso et al.	(TOKY, MASA)
PDG	82	PL 111B 1	M. Roos et al.	(HELS, CIT, CERN)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
ALSTON-...	78	PR D18 182	M. Alston-Garnjost et al.	(LBL, MTHO+) IJP
Also		PRL 38 1007	M. Alston-Garnjost et al.	(LBL, MTHO+) IJP
GOPAL	77	NP B119 362	G.P. Gopal et al.	(LOIC, RHEL) IJP

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
HEPP	76B	PL 65B 487	V. Hepp *et al.*	(CERN, HEIDH, MPIM)	IJP
BAILLON	75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHEL)	IJP
PONTE	75	PR D12 2597	R.A. Ponte *et al.*	(MASA, TENN, UCR)	IJP
VANHORN	75	NP B87 145	A.J. van Horn	(LBL)	IJP
Also		NP B87 157	A.J. van Horn	(LBL)	IJP
KANE	74	LBL-2452	D.F. Kane	(LBL)	IJP