

$\Sigma(1660) 1/2^+$ $I(J^P) = 1(\frac{1}{2}^+)$ Status: ***

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

 $\Sigma(1660)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1630 to 1690 (≈ 1660) OUR ESTIMATE			
1633 ± 3	GAO	12	DPWA $\bar{K}N \rightarrow \Lambda\pi$
1665.1 ± 11.2	¹ KOISO	85	DPWA $K^-p \rightarrow \Sigma\pi$
1670 ± 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1679 ± 10	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1676 ± 15	GOPAL	77	DPWA $\bar{K}N$ 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 $\bar{K}N$ multichannel
1660 ± 30	³ BAILLON	75	IPWA $\bar{K}N \rightarrow \Lambda\pi$
1671 ± 2	⁴ PONTE	75	DPWA $K^-p \rightarrow \Lambda\pi^0$

 $\Sigma(1660)$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
40 to 200 (≈ 100) OUR ESTIMATE			
121 $\begin{matrix} + 4 \\ - 7 \end{matrix}$	GAO	12	DPWA $\bar{K}N \rightarrow \Lambda\pi$
81.5 ± 22.2	¹ KOISO	85	DPWA $K^-p \rightarrow \Sigma\pi$
152 ± 20	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
38 ± 10	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
120 ± 20	GOPAL	77	DPWA $\bar{K}N$ multichannel
230 $\begin{matrix} +165 \\ - 60 \end{matrix}$	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 $\bar{K}N$ multichannel
80 ± 40	³ BAILLON	75	IPWA $\bar{K}N \rightarrow \Lambda\pi$
81 ± 10	⁴ PONTE	75	DPWA $K^-p \rightarrow \Lambda\pi^0$

 $\Sigma(1660)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	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.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$				Γ_1/Γ
VALUE	DOCUMENT ID	TECN	COMMENT	
0.1 to 0.3 OUR ESTIMATE				
0.12 ± 0.03	GOPAL	80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
0.10 ± 0.05	ALSTON-...	78	DPWA	$\bar{K}N \rightarrow \bar{K}N$
• • • 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	$\bar{K}N$ multichannel

$(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1660) \rightarrow \Lambda\pi$				$(\Gamma_1 \Gamma_2)^{1/2}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
$-0.064^{+0.005}_{-0.003}$	GAO	12	DPWA	$\bar{K}N \rightarrow \Lambda\pi$
< 0.04	GOPAL	77	DPWA	$\bar{K}N$ multichannel
$0.12^{+0.12}_{-0.04}$	VANHORN	75	DPWA	$K^- p \rightarrow \Lambda\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.10 or -0.11	² MARTIN	77	DPWA	$\bar{K}N$ multichannel
-0.04 ± 0.02	³ BAILLON	75	IPWA	$\bar{K}N \rightarrow \Lambda\pi$
$+0.16 \pm 0.01$	⁴ PONTE	75	DPWA	$K^- p \rightarrow \Lambda\pi^0$

$(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1660) \rightarrow \Sigma\pi$				$(\Gamma_1 \Gamma_3)^{1/2}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
-0.13 ± 0.04	¹ KOISO	85	DPWA	$K^- p \rightarrow \Sigma\pi$
-0.16 ± 0.03	GOPAL	77	DPWA	$\bar{K}N$ multichannel
-0.11 ± 0.01	KANE	74	DPWA	$K^- p \rightarrow \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.34 or -0.37	² MARTIN	77	DPWA	$\bar{K}N$ multichannel
not seen	HEPP	76B	DPWA	$K^- N \rightarrow \Sigma\pi$

 $\Sigma(1660)$ 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 <i>et al.</i>	(TOKY, MASA)
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, CIT, CERN)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
ALSTON-...	78	PR D18 182	M. Alston-Garnjost <i>et al.</i>	(LBL, MTHO+) IJP
Also		PRL 38 1007	M. Alston-Garnjost <i>et al.</i>	(LBL, MTHO+) IJP
GOPAL	77	NP B119 362	G.P. Gopal <i>et al.</i>	(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 <i>et al.</i>	(CERN, HEIDH, MPIM) IJP
BAILLON	75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHES) IJP
PONTE	75	PR D12 2597	R.A. Ponte <i>et al.</i>	(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
