

$\Sigma(1660) P_{11}$ $I(J^P) = 1(\frac{1}{2}^+)$ Status: ***

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

 $\Sigma(1660)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1630 to 1690 (≈ 1660) OUR ESTIMATE			
1665.1 \pm 11.2	¹ KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
1670 \pm 10	GOPAL	80	DPWA $\bar{K} N \rightarrow \bar{K} N$
1679 \pm 10	ALSTON-...	78	DPWA $\bar{K} N \rightarrow \bar{K} N$
1676 \pm 15	GOPAL	77	DPWA $\bar{K} N$ multichannel
1668 \pm 25	VANHORN	75	DPWA $K^- p \rightarrow \Lambda \pi^0$
1670 \pm 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 \pm 30	³ BAILLON	75	IPWA $\bar{K} N \rightarrow \Lambda \pi$
1671 \pm 2	⁴ PONTE	75	DPWA $K^- p \rightarrow \Lambda \pi^0$

 $\Sigma(1660)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
40 to 200 (≈ 100) OUR ESTIMATE			
81.5 \pm 22.2	¹ KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
152 \pm 20	GOPAL	80	DPWA $\bar{K} N \rightarrow \bar{K} N$
38 \pm 10	ALSTON-...	78	DPWA $\bar{K} N \rightarrow \bar{K} N$
120 \pm 20	GOPAL	77	DPWA $\bar{K} N$ multichannel
230 $\begin{smallmatrix} +165 \\ -60 \end{smallmatrix}$	VANHORN	75	DPWA $K^- p \rightarrow \Lambda \pi^0$
250 \pm 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 \pm 40	³ BAILLON	75	IPWA $\bar{K} N \rightarrow \Lambda \pi$
81 \pm 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	
< 0.04	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

KOISO	85	NP A433 619	H. Koiso <i>et al.</i>	(TOKY, MASA)
PDG	82	PL 111B	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, RHEL) 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
