

$\Lambda(1690) \ D_{03}$

$I(J^P) = 0(\frac{3}{2}^-)$ Status: * * * *

The measurements of the mass, width, and elasticity published before 1974 are now obsolete and have been omitted. They were last listed in our 1982 edition Physics Letters **111B** (1982).

$\Lambda(1690)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1685 to 1695 (≈ 1690) OUR ESTIMATE			
1695.7 $\pm$ 2.6	KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
1690 $\pm$ 5	GOPAL	80	DPWA $\overline{K} N \rightarrow \overline{K} N$
1692 $\pm$ 5	ALSTON-...	78	DPWA $\overline{K} N \rightarrow \overline{K} N$
1690 $\pm$ 5	GOPAL	77	DPWA $\overline{K} N$ multichannel
1690 $\pm$ 3	HEPP	76B	DPWA $K^- N \rightarrow \Sigma \pi$
1689 $\pm$ 1	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1687 or 1689	¹ MARTIN	77	DPWA $\overline{K} N$ multichannel
1692 $\pm$ 4	CARROLL	76	DPWA Isospin-0 total σ

$\Lambda(1690)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
50 to 70 (≈ 60) OUR ESTIMATE			
67.2 $\pm$ 5.6	KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
61 $\pm$ 5	GOPAL	80	DPWA $\overline{K} N \rightarrow \overline{K} N$
64 $\pm$ 10	ALSTON-...	78	DPWA $\overline{K} N \rightarrow \overline{K} N$
60 $\pm$ 5	GOPAL	77	DPWA $\overline{K} N$ multichannel
82 $\pm$ 8	HEPP	76B	DPWA $K^- N \rightarrow \Sigma \pi$
60 $\pm$ 4	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
62 or 62	¹ MARTIN	77	DPWA $\overline{K} N$ multichannel
38	CARROLL	76	DPWA Isospin-0 total σ

$\Lambda(1690)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \ N \overline{K}$	20–30 %
$\Gamma_2 \ \Sigma \pi$	20–40 %
$\Gamma_3 \ \Lambda \pi \pi$	$\sim$ 25 %
$\Gamma_4 \ \Sigma \pi \pi$	$\sim$ 20 %
$\Gamma_5 \ \Lambda \eta$	
$\Gamma_6 \ \Sigma(1385) \pi, \ S\text{-wave}$	

The above branching fractions are our estimates, not fits or averages.

$\Lambda(1690)$ BRANCHING RATIOS

The sum of all the quoted branching ratios is more than 1.0. The two-body ratios are from partial-wave analyses, and thus probably are more reliable than the three-body ratios, which are determined from bumps in cross sections. Of the latter, the $\Sigma\pi\pi$ bump looks more significant. (The error given for the $\Lambda\pi\pi$ ratio looks unreasonably small.) Hardly any of the $\Sigma\pi\pi$ decay can be via $\Sigma(1385)$, for then seven times as much $\Lambda\pi\pi$ decay would be required. 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
0.2 to 0.3 OUR ESTIMATE			
0.23 ± 0.03	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.22 ± 0.03	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.24 ± 0.03	GOPAL	77	DPWA See GOPAL 80
0.28 or 0.26	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
-0.34 ± 0.02	KOISO	85	DPWA $K^-p \rightarrow \Sigma\pi$
-0.25 ± 0.03	GOPAL	77	DPWA $\bar{K}N$ multichannel
-0.29 ± 0.03	HEPP	76B	DPWA $K^-N \rightarrow \Sigma\pi$
-0.28 ± 0.03	LONDON	75	HLBC $K^-p \rightarrow \Sigma^0\pi^0$
-0.28 ± 0.02	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
-0.30 or -0.28	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Lambda\eta$ $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
0.00 ± 0.03	BAXTER	73	DPWA $K^-p \rightarrow$ neutrals

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Lambda\pi\pi$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.25 ± 0.02	² BARTLEY	68	HDBC $K^-p \rightarrow \Lambda\pi\pi$

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma\pi\pi$ $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
0.21	ARMENTEROS68C	HDBC	$K^-N \rightarrow \Sigma\pi\pi$

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1690) \rightarrow \Sigma(1385)\pi$, S-wave $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$+0.27 \pm 0.04$	PREVOST	74	DPWA $K^-N \rightarrow \Sigma(1385)\pi$

$\Lambda(1690)$ FOOTNOTES

- ¹ The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. Another D_{03} Λ at 1966 MeV is also suggested by MARTIN 77, but is very uncertain.
- ² BARTLEY 68 uses only cross-section data. The enhancement is not seen by PREVOST 71.

$\Lambda(1690)$ 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	77	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	77B	NP B126 266	B.R. Martin, M.K. Pidcock	(LOUC)
Also	77C	NP B126 285	B.R. Martin, M.K. Pidcock	(LOUC) IJP
CARROLL	76	PRL 37 806	A.S. Carroll <i>et al.</i>	(BNL) I
HEPP	76B	PL 65B 487	V. Hepp <i>et al.</i>	(CERN, HEIDH, MPIM) IJP
LONDON	75	NP B85 289	G.W. London <i>et al.</i>	(BNL, CERN, EPOL+)
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
PREVOST	74	NP B69 246	J. Prevost <i>et al.</i>	(SACL, CERN, HEID)
BAXTER	73	NP B67 125	D.F. Baxter <i>et al.</i>	(OXF) IJP
PREVOST	71	Amsterdam Conf.	J. Prevost	(CERN, HEID, SACL)
ARMENTEROS	68C	NP B8 216	R. Armenteros <i>et al.</i>	(CERN, HEID, SACL) I
BARTLEY	68	PRL 21 1111	J.H. Bartley <i>et al.</i>	(TUFTS, FSU, BRAN) I
