

**$\Lambda(1690) D_{03}$**  $I(J^P) = 0(\frac{3}{2}^-)$  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
<b>1685 to 1695 (<math>\approx</math> 1690) OUR ESTIMATE</b>			
1695.7 $\pm$ 2.6	KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
1690 $\pm$ 5	GOPAL	80	DPWA $\bar{K} N \rightarrow \bar{K} N$
1692 $\pm$ 5	ALSTON-...	78	DPWA $\bar{K} N \rightarrow \bar{K} N$
1690 $\pm$ 5	GOPAL	77	DPWA $\bar{K} N$ 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	<sup>1</sup> MARTIN	77	DPWA $\bar{K} N$ multichannel
1692 $\pm$ 4	CARROLL	76	DPWA Isospin-0 total $\sigma$

 **$\Lambda(1690)$  WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>50 to 70 (<math>\approx</math> 60) OUR ESTIMATE</b>			
67.2 $\pm$ 5.6	KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
61 $\pm$ 5	GOPAL	80	DPWA $\bar{K} N \rightarrow \bar{K} N$
64 $\pm$ 10	ALSTON-...	78	DPWA $\bar{K} N \rightarrow \bar{K} N$
60 $\pm$ 5	GOPAL	77	DPWA $\bar{K} N$ 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	<sup>1</sup> MARTIN	77	DPWA $\bar{K} N$ multichannel
38	CARROLL	76	DPWA Isospin-0 total $\sigma$

 **$\Lambda(1690)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	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-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  $\Lambda$  and  $\Sigma$  Resonances.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$

### 0.2 to 0.3 OUR ESTIMATE

VALUE	DOCUMENT ID	TECN	COMMENT
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	<sup>1</sup> 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	<sup>1</sup> 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	<sup>2</sup> 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±0.04	PREVOST	74	DPWA $K^-N \rightarrow \Sigma(1385)\pi$

## $\Lambda(1690)$ FOOTNOTES

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

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## $\Lambda(1690)$ 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

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