

$\Lambda(1670) S_{01}$

$I(J^P) = 0(\frac{1}{2}^-)$ 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).

$\Lambda(1670)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1660 to 1680 (≈ 1670) OUR ESTIMATE			
1677.5 \pm 0.8	¹ GARCIA-REC...03	DPWA	$\bar{K}N$ multichannel
1673 \pm 2	MANLEY	02	DPWA $\bar{K}N$ multichannel
1670.8 \pm 1.7	KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
1667 \pm 5	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1671 \pm 3	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1670 \pm 5	GOPAL	77	DPWA $\bar{K}N$ multichannel
1675 \pm 2	HEPP	76B	DPWA $K^- N \rightarrow \Sigma \pi$
1679 \pm 1	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
1665 \pm 5	PREVOST	74	DPWA $K^- N \rightarrow \Sigma(1385)\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1668.9 \pm 2.0	ABAEV	96	DPWA $K^- p \rightarrow \Lambda \eta$
1664	² MARTIN	77	DPWA $\bar{K}N$ multichannel

$\Lambda(1670)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
25 to 50 (≈ 35) OUR ESTIMATE			
29.2 \pm 1.4	¹ GARCIA-REC...03	DPWA	$\bar{K}N$ multichannel
23 \pm 6	MANLEY	02	DPWA $\bar{K}N$ multichannel
34.1 \pm 3.7	KOISO	85	DPWA $K^- p \rightarrow \Sigma \pi$
29 \pm 5	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
29 \pm 5	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
45 \pm 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
46 \pm 5	HEPP	76B	DPWA $K^- N \rightarrow \Sigma \pi$
40 \pm 3	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
19 \pm 5	PREVOST	74	DPWA $K^- N \rightarrow \Sigma(1385)\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
21.1 \pm 3.6	ABAEV	96	DPWA $K^- p \rightarrow \Lambda \eta$
12	² MARTIN	77	DPWA $\bar{K}N$ multichannel

$\Lambda(1670)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	20–30 %
Γ_2 $\Sigma\pi$	25–55 %
Γ_3 $\Lambda\eta$	10–25 %
Γ_4 $\Sigma(1385)\pi$	

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

$\Lambda(1670)$ 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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.20 to 0.30 OUR ESTIMATE			
0.37±0.07	MANLEY	02	DPWA $\bar{K}N$ multichannel
0.18±0.03	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.17±0.03	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.20±0.03	GOPAL	77	DPWA See GOPAL 80
0.15	² MARTIN	77	DPWA $\bar{K}N$ multichannel

$\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$ Γ_3/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.30±0.08	ABAEV	96	DPWA $K^-p \rightarrow \Lambda\eta$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1670) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
−0.38±0.03	MANLEY	02	DPWA $\bar{K}N$ multichannel
−0.26±0.02	KOISO	85	DPWA $K^-p \rightarrow \Sigma\pi$
−0.31±0.03	GOPAL	77	DPWA $\bar{K}N$ multichannel
−0.29±0.03	HEPP	76B	DPWA $K^-N \rightarrow \Sigma\pi$
−0.23±0.03	LONDON	75	HLBC $K^-p \rightarrow \Sigma^0\pi^0$
−0.27±0.02	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
−0.13	² MARTIN	77	DPWA $\bar{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1670) \rightarrow \Lambda\eta$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.24±0.04	MANLEY	02	DPWA $\bar{K}N$ multichannel
+0.20±0.05	BAXTER	73	DPWA $K^-p \rightarrow$ neutrals
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
0.24	KIM	71	DPWA K-matrix analysis
0.26	ARMENTEROS69C	HBC	
0.20 or 0.23	BERLEY	65	HBC

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1670) \rightarrow \Sigma(1385)\pi$	$(\Gamma_1 \Gamma_4)^{1/2} / \Gamma$
VALUE	DOCUMENT ID TECN COMMENT
-0.17 ± 0.06	MANLEY 02 DPWA $\bar{K}N$ multichannel
-0.18 ± 0.05	PREVOST 74 DPWA $K^- N \rightarrow \Sigma(1385)\pi$

$\Lambda(1670)$ FOOTNOTES

- ¹ GARCIA-RECIO 03 gives pole, not Breit-Wigner, parameters, but the narrow width of the $\Lambda(1670)$ means there will be little difference.
- ² MARTIN 77 obtains identical resonance parameters from a T-matrix pole and from a Breit-Wigner fit.

$\Lambda(1670)$ REFERENCES

GARCIA-REC...	03	PR D67 076009	C. Garcia-Recio <i>et al.</i>	(GRAN, VALE)
MANLEY	02	PRL 88 012002	D.M. Manley <i>et al.</i>	(BNL Crystal Ball Collab.)
ABAEV	96	PR C53 385	V.V. Abaev, B.M.K. Nefkens	(UCLA)
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
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
KIM	71	PRL 27 356	J.K. Kim	(HARV) IJP
Also	70	Duke Conf. 161	J.K. Kim	(HARV) IJP
Hyperon Resonances, 1970				
ARMENTEROS	69C	Lund Paper 229	R. Armenteros <i>et al.</i>	(CERN, HEID, SACL) IJP
Values are quoted in LEVI-SETTI 69.				
BERLEY	65	PRL 15 641	D. Berley <i>et al.</i>	(BNL) IJP