

$\Lambda(1670) 1/2^-$  $I(J^P) = 0(\frac{1}{2}^-)$  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** 1 (1982).

 **$\Lambda(1670)$  MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1660 to 1680 (<math>\approx 1670</math>) OUR ESTIMATE</b>			
1672 $\pm 3$	ZHANG	13A	DPWA Multichannel
1677.5 $\pm 0.8$	<sup>1</sup> 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	<sup>2</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel

 **$\Lambda(1670)$  WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>25 to 50 (<math>\approx 35</math>) OUR ESTIMATE</b>			
29 $\pm 5$	ZHANG	13A	DPWA Multichannel
29.2 $\pm 1.4$	<sup>1</sup> 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	<sup>2</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel

 **$\Lambda(1670)$  POLE POSITIONS****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
1667	ZHANG	13A	DPWA Multichannel

**–2×IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
26	ZHANG	13A DPWA	Multichannel

**$\Lambda(1670)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	20–30 %
$\Gamma_2$ $\Sigma\pi$	25–55 %
$\Gamma_3$ $\Lambda\eta$	10–25 %
$\Gamma_4$ $\Sigma(1385)\pi$	
The above branching fractions are our estimates, not fits or averages.	
$\Gamma_5$ $N\bar{K}^*(892)$ , $S=3/2$ , $D$ -wave	(5±4) %

**$\Lambda(1670)$  BRANCHING RATIOS**

See “Sign conventions for resonance couplings” in the Note on  $\Lambda$  and  $\Sigma$  Resonances.

<u><math>\Gamma(N\bar{K})/\Gamma_{\text{total}}</math></u>	<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_1/\Gamma$
<b>0.20 to 0.30 OUR ESTIMATE</b>					
	0.26±0.25	ZHANG	13A DPWA	Multichannel	
	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	<sup>2</sup> MARTIN	77 DPWA	$\bar{K}N$ multichannel	

<u><math>\Gamma(\Lambda\eta)/\Gamma_{\text{total}}</math></u>	<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_3/\Gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
	0.30±0.08	ABAEV	96 DPWA	$K^-p \rightarrow \Lambda\eta$	

<u><math>(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}</math> in <math>N\bar{K} \rightarrow \Lambda(1670) \rightarrow \Sigma\pi</math></u>	<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$
	–0.29±0.06	ZHANG	13A DPWA	Multichannel	
	–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	<sup>2</sup> MARTIN	77 DPWA	$\bar{K}N$ multichannel	

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1670) \rightarrow \Lambda\eta$				$(\Gamma_1 \Gamma_3)^{1/2} / \Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
$-0.30 \pm 0.10$	ZHANG	13A	DPWA	Multichannel
$+0.24 \pm 0.04$	MANLEY	02	DPWA	$\bar{K}N$ multichannel
$+0.20 \pm 0.05$	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	
$-0.17 \pm 0.06$	MANLEY	02	DPWA	$\bar{K}N$ multichannel
$-0.18 \pm 0.05$	PREVOST	74	DPWA	$K^- N \rightarrow \Sigma(1385)\pi$

$\Gamma(N\bar{K}^*(892), S=3/2, D\text{-wave}) / \Gamma_{\text{total}}$				$\Gamma_5 / \Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.05 ± 0.04</b>	ZHANG	13A	DPWA	Multichannel

### $\Lambda(1670)$ FOOTNOTES

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

### $\Lambda(1670)$ REFERENCES

ZHANG	13A	PR C88 035205	H. Zhang <i>et al.</i>	(KSU)
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 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
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		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