

$\Lambda(1600) \ 1/2^+$  $I(J^P) = 0(\frac{1}{2}^+)$  Status: \*\*\*

See also the  $\Lambda(1810) \ P_{01}$ . There are quite possibly two  $P_{01}$  states in this region.

 **$\Lambda(1600)$  MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1560 to 1700 (<math>\approx 1600</math>) OUR ESTIMATE</b>			
1592 $\pm$ 10	ZHANG	13A	DPWA Multichannel
1568 $\pm$ 20	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1703 $\pm$ 100	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
1573 $\pm$ 25	GOPAL	77	DPWA $\bar{K}N$ multichannel
1596 $\pm$ 6	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
1620 $\pm$ 10	LANGBEIN	72	IPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1572 or 1617	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
1646 $\pm$ 7	<sup>2</sup> CARROLL	76	DPWA Isospin-0 total $\sigma$
1570	KIM	71	DPWA K-matrix analysis

 **$\Lambda(1600)$  WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>50 to 250 (<math>\approx 150</math>) OUR ESTIMATE</b>			
150 $\pm$ 28	ZHANG	13A	DPWA Multichannel
116 $\pm$ 20	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
593 $\pm$ 200	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
147 $\pm$ 50	GOPAL	77	DPWA $\bar{K}N$ multichannel
175 $\pm$ 20	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
60 $\pm$ 10	LANGBEIN	72	IPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
247 or 271	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
20	<sup>2</sup> CARROLL	76	DPWA Isospin-0 total $\sigma$
50	KIM	71	DPWA K-matrix analysis

 **$\Lambda(1600)$  POLE POSITION****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. • • •			
1572	ZHANG	13A	DPWA Multichannel

**-2xIMAGINARY 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. • • •			
138	ZHANG	13A	DPWA Multichannel

## $\Lambda(1600)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	15–30 %
$\Gamma_2$ $\Sigma\pi$	10–60 %

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

## $\Lambda(1600)$ BRANCHING RATIOS

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

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$				$\Gamma_1/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
<b>0.15 to 0.30 OUR ESTIMATE</b>				
$0.14 \pm 0.04$	ZHANG	13A	DPWA	Multichannel
$0.23 \pm 0.04$	GOPAL	80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
$0.14 \pm 0.05$	ALSTON-...	78	DPWA	$\bar{K}N \rightarrow \bar{K}N$
$0.25 \pm 0.15$	LANGBEIN	72	IPWA	$\bar{K}N$ multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$0.24 \pm 0.04$	GOPAL	77	DPWA	See GOPAL 80
0.30 or 0.29	<sup>1</sup> MARTIN	77	DPWA	$\bar{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Lambda(1600) \rightarrow \Sigma\pi$				$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
$-0.23 \pm 0.03$	ZHANG	13A	DPWA	Multichannel
$-0.16 \pm 0.04$	GOPAL	77	DPWA	$\bar{K}N$ multichannel
$-0.33 \pm 0.11$	KANE	74	DPWA	$K^-p \rightarrow \Sigma\pi$
$0.28 \pm 0.09$	LANGBEIN	72	IPWA	$\bar{K}N$ multichannel
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$-0.39$ or $-0.39$	<sup>1</sup> MARTIN	77	DPWA	$\bar{K}N$ multichannel
not seen	HEPP	76B	DPWA	$K^-N \rightarrow \Sigma\pi$

## $\Lambda(1600)$ FOOTNOTES

<sup>1</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

<sup>2</sup> A total cross-section bump with  $(J+1/2)\Gamma_{\text{el}}/\Gamma_{\text{total}} = 0.04$ .

## $\Lambda(1600)$ REFERENCES

ZHANG	13A	PR C88 035205	H. Zhang <i>et al.</i>	(KSU)
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
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
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
LANGBEIN	72	NP B47 477	W. Langbein, F. Wagner	(MPIM) IJP
KIM	71	PRL 27 356	J.K. Kim	(HARV) IJP