

# $\Lambda(1600) P_{01}$

$$I(J^P) = 0(\frac{1}{2}^+) \quad \text{Status: } ***$$

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

## $\Lambda(1600)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>1560 to 1700 (<math>\approx 1600</math>) OUR ESTIMATE</b>			
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

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>50 to 250 (<math>\approx 150</math>) OUR ESTIMATE</b>			
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

## $\Lambda(1600)$ DECAY MODES

Mode	Fraction ( $\Gamma_j/\Gamma$ )
$\Gamma_1 \quad N\bar{K}$	15–30 %
$\Gamma_2 \quad \Sigma \pi$	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>				
0.23±0.04	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$	
0.14±0.05	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$	
0.25±0.15	LANGBEIN	72	IPWA $\bar{K}N$ multichannel	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
0.24±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	
-0.16±0.04	GOPAL	77	DPWA $\bar{K}N$ multichannel	
-0.33±0.11	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$	
0.28±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

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
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