

$\Lambda(1600) \ 1/2^+$ $I(J^P) = 0(\frac{1}{2}^+)$ 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>
1560 to 1700 (≈ 1600) OUR ESTIMATE			
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	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
1646 \pm 7	² CARROLL	76	DPWA Isospin-0 total σ
1570	KIM	71	DPWA K-matrix analysis

 $\Lambda(1600)$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
50 to 250 (≈ 150) OUR ESTIMATE			
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	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
20	² CARROLL	76	DPWA Isospin-0 total σ
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 (Γ_i/Γ)
Γ_1 $N\bar{K}$	15–30 %
Γ_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 Λ and Σ Resonances.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$				Γ_1/Γ
VALUE	DOCUMENT ID	TECN	COMMENT	
0.15 to 0.30 OUR ESTIMATE				
0.14±0.04	ZHANG	13A	DPWA	Multichannel
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	¹ 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±0.03	ZHANG	13A	DPWA	Multichannel
−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	¹ MARTIN	77	DPWA	$\bar{K}N$ multichannel
not seen	HEPP	76B	DPWA	$K^-N \rightarrow \Sigma\pi$

 $\Lambda(1600)$ FOOTNOTES

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

² 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