$\Lambda(1600)$ $1/2^+$

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

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

$\Lambda(1600)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1560 to 1700 (≈ 1600) OUR ESTIMATE				
1568± 20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1703±100	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
1573± 25	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1596± 6	KANE	74	DPWA	$K^- p \to \Sigma\pi$
1620± 10	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1572 or 1617	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
1646± 7	[2] CARROLL	76	DPWA	Isospin-0 total σ
1570	KIM	71	DPWA	K-matrix analysis

$\Lambda(1600)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
50 to 250 (≈ 150) OUR ESTIMATE				
116± 20	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
593±200	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
147± 50	GOPAL	77	DPWA	$\overline{K}N$ multichannel
175± 20	KANE	74	DPWA	$K^- p \to \Sigma\pi$
60± 10	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
247 or 271	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel
20	[2] CARROLL	76	DPWA	Isospin-0 total σ
50	KIM	71	DPWA	K-matrix analysis

$\Lambda(1600)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	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.

$\Gamma(N\overline{K})/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.15 to 0.30 OUR ESTIMATE				
0.23 ± 0.04	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$
0.14 ± 0.05	ALSTON-...	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$
0.25 ± 0.15	LANGBEIN	72	IPWA	$\overline{K}N$ 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	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Lambda(1600) \rightarrow \Sigma\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.16 ± 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.33 ± 0.11	KANE	74	DPWA	$K^- p \rightarrow \Sigma\pi$
0.28 ± 0.09	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.39 or -0.39	[1] MARTIN	77	DPWA	$\overline{K}N$ 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 $(J+1/2)\ \Gamma_{el}\ /\ \Gamma_{total} = 0.04$.

$\Lambda(1600)$ REFERENCES

GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP
ALSTON-...	78	PR D18 182	M. Alston-Garnjost et al.	(LBL, MTHO+) IJP
Also		PRL 38 1007	M. Alston-Garnjost et al.	(LBL, MTHO+) IJP
GOPAL	77	NP B119 362	G.P. Gopal et al.	(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 et al.	(BNL) I
HEPP	76B	PL 65B 487	V. Hepp et al.	(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