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

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

$\Lambda(1600)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1540 to 1560 (≈ 1550) OUR ESTIMATE				
1546±6 OUR AVERAGE Error includes scale factor of 2.1.				
1562±8	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1544^{+3}_{-3}	[1] KAMANO	15	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1572	ZHANG	13A	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
120 to 240 (≈ 180) OUR ESTIMATE				
$\mathbf{159^{+60}_{-12}}$ **OUR AVERAGE** Error includes scale factor of 6.2.				
232±15	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
$112^{+12}_{-\ 2}$	[1] KAMANO	15	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
138	ZHANG	13A	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$\Lambda(1600)$ POLE RESIDUES

The normalized residue is the residue divided by $\Gamma_{pole}/2$.

Normalized residue in $N\overline{K} \to \Lambda(1600) \to N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.36 ±0.07	**−63 ± 10**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.105	−80	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Lambda(1600) \to \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.39 ±0.08	**148 ± 10**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.232	108	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Lambda(1600) \to \Lambda\eta$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.22±0.13	**180 ± 20**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(1600) \to \Lambda\sigma$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.30±0.06	**−70 ± 10**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(1600) \to \Sigma(1385)\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.37 ±0.07	**103 ± 12**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.183	77	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

Normalized residue in $N\overline{K} \to \Lambda(1600) \to N\overline{K}^*(892)$, S=1/2, P-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.02±0.01	**126 ± 45**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \to \Lambda(1600) \to N\overline{K}^*(892)$, S=3/2, P-wave

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.02±0.01	**−135 ± 45**	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel

Λ(1600) MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1570 to 1630 (≈ 1600) OUR ESTIMATE			
1605± 8	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
1592± 10	ZHANG 13A	DPWA	Multichannel
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

[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 $(J+1/2)\ \Gamma_{el}\ /\ \Gamma_{total} = 0.04$.

Λ(1600) WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
150 to 250 (≈ 200) OUR ESTIMATE			
245± 15	SARANTSEV 19	DPWA	$\overline{K}N$ multichannel
150± 28	ZHANG 13A	DPWA	Multichannel
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

[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 $(J+1/2)\ \Gamma_{el}\ /\ \Gamma_{total} = 0.04$.

Λ(1600) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	15–30 %
Γ_2	$\Sigma\pi$	10–60 %
Γ_3	$\Lambda\sigma$	(19±4) %
Γ_4	$\Sigma(1385)\pi$	(9±4) %

Λ(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
0.14 to 0.28 OUR ESTIMATE				
0.29 ±0.06	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.14 ±0.04	ZHANG	13A	DPWA	Multichannel
0.23 ±0.04	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.14 ±0.05	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
0.25 ±0.15	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.064	[1] KAMANO	15	DPWA	Multichannel
0.24 ±0.04	GOPAL	77	DPWA	See GOPAL 80
0.30 or 0.29	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.
[2] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

$\Gamma(\Sigma\pi)/\Gamma_{total}$ — Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.37 ±0.07	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.851	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$\Gamma(\Lambda\sigma)/\Gamma_{total}$ — Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.19±0.04	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$ Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.09 ±0.04	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.085	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

$(\Gamma_i\Gamma_f)^{½}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1600) \to \Sigma\pi$ $(\Gamma_1\Gamma_2)^{½}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
-0.23 ± 0.03	ZHANG	13A	DPWA	Multichannel
-0.16 ± 0.04	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.33 ± 0.11	KANE	74	DPWA	$K^- p \to \Sigma\pi$
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	$K^- N \to \Sigma\pi$

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

$\Lambda(1600)$ REFERENCES

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)
KAMANO	15	PR C92 025205	H. Kamano *et al.*	(ANL, OSAK)
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)
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