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

$I(J^P) = 0(\frac{1}{2}^+)$ 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 $(J+1/2)\ \Gamma_{el}\ /\ \Gamma_{total} = 0.04$.

$\Lambda(1600)$ 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) %

$\Lambda(1600)$ 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*
0.14 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.

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

VALUE	DOCUMENT ID		TECN	COMMENT
-0.23 ± 0.03	ZHANG	13A	DPWA	Multichannel
-0.16 ± 0.04	GOPAL	77	DPWA	$\overline{K}N$ 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