

$\Lambda(1600) \ 1/2^+$  $I(J^P) = 0(\frac{1}{2}^+) \ \text{Status: } ***$ 

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

 **$\Lambda(1600)$  POLE POSITION****REAL PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$1544^{+3}_{-3}$	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

1572	ZHANG	13A	DPWA Multichannel
------	-------	-----	-------------------

<sup>1</sup> From the preferred solution A in KAMANO 15.

**−2×IMAGINARY PART**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$112^{+12}_{-2}$	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

138	ZHANG	13A	DPWA Multichannel
-----	-------	-----	-------------------

<sup>1</sup> 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  $N\bar{K} \rightarrow \Lambda(1600) \rightarrow N\bar{K}$** 

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.105	−80	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

<sup>1</sup> From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1600) \rightarrow \Sigma\pi$** 

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.232	108	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

<sup>1</sup> From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1600) \rightarrow \Sigma(1385)\pi$** 

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.183	77	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

<sup>1</sup> From the preferred solution A in KAMANO 15.

**$\Lambda(1600)$  MASS**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>1560 to 1700 (<math>\approx 1600</math>) OUR ESTIMATE</b>			
$1592 \pm 10$	ZHANG	13A	DPWA Multichannel
$1568 \pm 20$	GOPAL	80	DPWA $\overline{K}N \rightarrow \overline{K}N$
$1703 \pm 100$	ALSTON-...	78	DPWA $\overline{K}N \rightarrow \overline{K}N$
$1573 \pm 25$	GOPAL	77	DPWA $\overline{K}N$ multichannel
$1596 \pm 6$	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
$1620 \pm 10$	LANGBEIN	72	IPWA $\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1572 or 1617	<sup>1</sup> MARTIN	77	DPWA $\overline{K}N$ multichannel
$1646 \pm 7$	<sup>2</sup> CARROLL	76	DPWA Isospin-0 total $\sigma$
1570	KIM	71	DPWA K-matrix analysis
<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 $(J+1/2) \Gamma_{\text{el}} / \Gamma_{\text{total}} = 0.04$ .			

 **$\Lambda(1600)$  WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>50 to 250 (<math>\approx 150</math>) OUR ESTIMATE</b>			
$150 \pm 28$	ZHANG	13A	DPWA Multichannel
$116 \pm 20$	GOPAL	80	DPWA $\overline{K}N \rightarrow \overline{K}N$
$593 \pm 200$	ALSTON-...	78	DPWA $\overline{K}N \rightarrow \overline{K}N$
$147 \pm 50$	GOPAL	77	DPWA $\overline{K}N$ multichannel
$175 \pm 20$	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
$60 \pm 10$	LANGBEIN	72	IPWA $\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
247 or 271	<sup>1</sup> MARTIN	77	DPWA $\overline{K}N$ multichannel
20	<sup>2</sup> CARROLL	76	DPWA Isospin-0 total $\sigma$
50	KIM	71	DPWA K-matrix analysis
<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 $(J+1/2) \Gamma_{\text{el}} / \Gamma_{\text{total}} = 0.04$ .			

 **$\Lambda(1600)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i / \Gamma$ )
$\Gamma_1$ $N\overline{K}$	15–30 %
$\Gamma_2$ $\Sigma \pi$	10–60 %
$\Gamma_3$ $\Sigma(1385)\pi$	

**$\Lambda(1600)$  BRANCHING RATIOS**

See “Sign conventions for resonance couplings” in the Note on  $\Lambda$  and  $\Sigma$  Resonances.

 **$\Gamma(N\bar{K})/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.15 to 0.30 OUR ESTIMATE</b>			
0.14 $\pm 0.04$	ZHANG	13A	DPWA Multichannel
0.23 $\pm 0.04$	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.14 $\pm 0.05$	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.25 $\pm 0.15$	LANGBEIN	72	IPWA $\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.064	<sup>1</sup> KAMANO	15	DPWA Multichannel
0.24 $\pm 0.04$	GOPAL	77	DPWA See GOPAL 80
0.30 or 0.29	<sup>2</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel

<sup>1</sup> From the preferred solution A in KAMANO 15.

<sup>2</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

 **$\Gamma(\Sigma\pi)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.851	<sup>1</sup> KAMANO	15	DPWA Multichannel

<sup>1</sup> From the preferred solution A in KAMANO 15.

 **$\Gamma(\Sigma(1385)\pi)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.085	<sup>1</sup> KAMANO	15	DPWA Multichannel

<sup>1</sup> From the preferred solution A in KAMANO 15.

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
-0.23 $\pm 0.03$	ZHANG	13A	DPWA Multichannel
-0.16 $\pm 0.04$	GOPAL	77	DPWA $\bar{K}N$ multichannel
-0.33 $\pm 0.11$	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$
0.28 $\pm 0.09$	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 $K^-N \rightarrow \Sigma\pi$

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

## $\Lambda(1600)$ REFERENCES

KAMANO	15	PR C92 025205	H. Kamano <i>et al.</i>	(ANL, OSAK)
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

---