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

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

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

Λ(1600) POLE POSITION

REAL PAR <i>VALUE</i> (MeV)	•	DOCUMENT IL)	TECN	COMMENT
1544 ⁺³		1 KAMANO	15		Multichannel
•	not use the follo	wing data for averag	ges, fits,		
1572		ZHANG			Multichannel
$^{ m 1}$ From the	preferred solutio	n A in KAMANO 15			
– 2×IMAGI VALUE (MeV)	NARY PART	DOCUMENT IE)	TECN	COMMENT
112 ⁺¹²		1 KAMANO			Multichannel
_	not use the follo	wing data for averag	es, fits,	limits, e	tc. • • •
138		ZHANG	13A	DPWA	Multichannel
$^{ m 1}$ From the	preferred solutio	n A in KAMANO 15			
Normalized	normalized resid	Λ (1600) POLE R ue is the residue divi $\overline{\Lambda} \rightarrow \Lambda(1600) \rightarrow \Omega_{OCUMEN}$	ded by	$\Gamma_{pole}/2$	
Normalized MODULUS • • • We do 0.105 1 From the	residue in N N N N N N N N N N N N N N N N N N	ue is the residue divi $ \overline{C} \rightarrow \Lambda(1600) \rightarrow \frac{DOCUMEN}{C} $ wing data for averag 1 KAMANO n A in KAMANO 15	NK TID ges, fits,	$\Gamma_{pole}/2$. TECH limits, 6	N <u>COMMENT</u>
Normalized MODULUS • • • We do 0.105 1 From the Normalized	residue in N R PHASE (°) not use the follo -80 preferred solutio residue in N R	ue is the residue divi $ \overline{A} \rightarrow \Lambda(1600) \rightarrow \underline{DOCUMEN} $ wing data for averag $ ^{1} \text{ KAMANO} $ on A in KAMANO 15 $ \overline{A} \rightarrow \Lambda(1600) \rightarrow $	ded by $N\overline{K}$ T ID T	Γ _{pole} /2. <u>TEC</u> limits, ε 5 DPV	V COMMENT etc. • • • VA Multichannel
Normalized MODULUS • • • We do 0.105 1 From the Normalized MODULUS	residue in N N N N N N N N N N N N N N N N N N	ue is the residue divi $ \overline{A} \rightarrow \Lambda(1600) \rightarrow \underline{DOCUMEN} $ wing data for averag $ ^{1} \text{ KAMANO} $ on A in KAMANO 15 $ \overline{A} \rightarrow \Lambda(1600) \rightarrow $	ded by $N\overline{K}$ T ID ges, fits, D D T D T D	Γ _{pole} /2. <u>TECI</u> limits, ε 5 DPV	V COMMENT VA Multichannel V COMMENT
Normalized MODULUS • • • We do 0.105 1 From the Normalized MODULUS • • • We do	residue in N N N N N N N N N N N N N N N N N N	ue is the residue divi $\overline{A} \rightarrow \Lambda(1600) \rightarrow \frac{DOCUMEN}{1}$ wing data for average 1 KAMANO IN A in KAMANO 15 $\overline{A} \rightarrow \Lambda(1600) \rightarrow \frac{DOCUMEN}{1}$	ded by $N\overline{K}$ $T ID$ ges, fits, $T ID$	Γ _{pole} /2. TECI limits, ε TECI limits, ε	V COMMENT VA Multichannel V COMMENT
Normalized MODULUS • • • We do 0.105 1 From the Normalized MODULUS • • • We do 0.232	residue in N N N N N N N N N N N N N N N N N N	ue is the residue divi $\overline{A} \rightarrow \Lambda(1600) \rightarrow DOCUMEN$ wing data for average 1 KAMANO 15 $\overline{A} \rightarrow \Lambda(1600) \rightarrow DOCUMEN$ wing data for average	ded by $N\overline{K}$ $T ID$	Γ _{pole} /2. TECH Iimits, 6 5 DPV TECH Iimits, 6	V COMMENT NA Multichannel V COMMENT Stc. • • •
Normalized MODULUS • • • We do 0.105 1 From the Normalized MODULUS • • • We do 0.232 1 From the	residue in N k PHASE (°) not use the follo -80 preferred solutio residue in N k PHASE (°) not use the follo 108 preferred solutio residue in N k	ue is the residue divi $\overline{A} \rightarrow A(1600) \rightarrow \frac{DOCUMEN}{1}$ wing data for average 1 KAMANO IN A IN KAMANO 15 $\overline{A} \rightarrow A(1600) \rightarrow \frac{DOCUMEN}{1}$ wing data for average 1 KAMANO	ded by $N\overline{K}$ $T ID$	$\Gamma_{pole}/2$. Imits, ϵ 5 DPV $TECO$ limits, ϵ 5 DPV $TECO$	V COMMENT NA Multichannel V COMMENT Stc. • • •
Normalized MODULUS • • • We do 0.105 1 From the Normalized MODULUS • • • We do 0.232 1 From the Normalized MODULUS	residue in N k PHASE (°) not use the follo 80 preferred solutio residue in N k PHASE (°) not use the follo 108 preferred solutio residue in N k PHASE (°)	ue is the residue divi	ded by $ \begin{array}{c} N\overline{K} \\ T ID \\ \text{ges, fits,} \\ \Sigma \pi \\ T ID \\ \text{ges, fits,} \\ \Sigma \pi \\ T ID \\ \Sigma \text{ges, fits,} \\ \Sigma \pi \\ T ID \\ T ID \\ T ID \\ T ID T $	$\Gamma_{pole}/2$. TECH limits, 6 5 DPV TECH limits, 6 5 DPV	V COMMENT V COMMENT
Normalized MODULUS • • • We do 0.105 1 From the Normalized MODULUS • • • We do 0.232 1 From the Normalized MODULUS	residue in N k PHASE (°) not use the follo 80 preferred solutio residue in N k PHASE (°) not use the follo 108 preferred solutio residue in N k PHASE (°)	ue is the residue divi	ded by $ \begin{array}{c} N\overline{K} \\ T ID \\ \text{ges, fits,} \\ \end{array} $ $ \begin{array}{c} \Sigma \pi \\ T ID \\ \text{ges, fits,} \\ \end{array} $ $ \begin{array}{c} \Sigma (13) \\ T ID \\ \text{ges, fits,} \\ \end{array} $	$\Gamma_{pole}/2$. Imits, ϵ 5 DPV TECH limits, ϵ 5 DPV 885) π TECH limits, ϵ	V COMMENT V COMMENT

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Λ(1600) MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
1560 to 1700 (≈ 1600) OUR EST	IMATE				
1592 ± 10	ZHANG	13A	DPWA	Multichannel	
1568± 20	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$	
1703 ± 100	ALSTON	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$	
1573± 25	GOPAL	77	DPWA	$\overline{K}N$ multichannel	
1596 ± 6	KANE	74	DPWA	$K^-p \rightarrow \Sigma \pi$	
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 $(J+1/2)$ Γ_{A-1} $J=0.04$					

A total cross-section bump with (J+1/2) Γ_{el} / I_{total} = 0.04.

Λ(1600) WIDTH

VALUE (MeV)	DOCUMENT ID	DOCUMENT ID		COMMENT	
50 to 250 (≈ 150) OU	JR ESTIMATE				
150± 28	ZHANG	13A	DPWA	Multichannel	
$116\pm~20$	GOPAL	80	DPWA	$\overline{K}N \rightarrow \overline{K}N$	
593 ± 200	ALSTON	78	DPWA	$\overline{K}N \rightarrow \overline{K}N$	
147 ± 50	GOPAL	77	DPWA	$\overline{K}N$ multichannel	
175 ± 20	KANE	74	DPWA	$K^- p \rightarrow \Sigma \pi$	
60± 10	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel	
• • We do not use the following data for averages, fits, limits, etc. • •					
247 or 271	$^{ m 1}$ 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-matri	x pole	and from	m a Breit-Wigner fit.	
² A total cross-sectio	n bump with $(J+1/2)$ $\Gamma_{\rm el}$ /	Γ_{total}	= 0.04.	in a Breit Wigher III.	

Λ(1600) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
$\overline{\Gamma_1}$	N\overline{K}	15–30 %
	$\Sigma \pi$	10–60 %
Γ ₃	$\Sigma(1385)\pi$	

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Λ(1600) BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on \varLambda and \varSigma Resonances.

$\Gamma(N\overline{K})/\Gamma_{\text{total}}$				Γ_1/Γ	
VALUE	DOCUMENT ID		TECN	COMMENT	
0.15 to 0.30 OUR ESTIMATE					
0.14 ± 0.04	ZHANG	13A		<u>Multichannel</u>	
0.23 ± 0.04	GOPAL	80		$\overline{K}N \rightarrow \overline{K}N$	
0.14 ± 0.05	ALSTON	78		$\overline{K}N \rightarrow \overline{K}N$	
0.25 ± 0.15	LANGBEIN	72		$\overline{K}N$ multichannel	
• • • We do not use the following of	data for averages	s, fits,	limits, e	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	
$^{ m 1}$ From the preferred solution A in	KAMANO 15.				
² The two MARTIN 77 values are		k pole	and from	m a Breit-Wigner fit.	
$\Gamma(\Sigma\pi)/\Gamma_{ ext{total}}$				Γ_2/Γ	
VALUE	DOCUMENT ID		TECN	<u>COMMENT</u>	
• • • We do not use the following of	data for averages	s, fits,	limits, e	etc. • • •	
0.851	¹ KAMANO	15	DPWA	Multichannel	
$^{ m 1}$ From the preferred solution A in	KAMANO 15.				
$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$				Г ₃ /Г	
VALUE	DOCUMENT ID		TECN	<u>COMMENT</u>	
• • • We do not use the following of					
· · · · · · · · · · · · · · · · · · ·	¹ KAMANO	15		Multichannel	
		13	DI WA	Multichanne	
¹ From the preferred solution A in	KAMANO 15.				
$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}} \text{ in } N\overline{K} \to \Lambda(16)$	$(00) \rightarrow \Sigma \pi$			$(\Gamma_1\Gamma_2)^{\frac{1}{2}}/\Gamma$	
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		$K^- p \rightarrow \Sigma \pi$	
0.28±0.09	LANGBEIN	72		$\overline{K}N$ multichannel	
• • We do not use the following data for averages, fits, limits, etc. • • •					
	¹ MARTIN	77		$\overline{K}N$ multichannel	
not seen	HEPP			$K^- N \rightarrow \Sigma \pi$	
¹ The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.					

∧(1600) REFERENCES

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