

$\Lambda(1830) \ 5/2^-$  $I(J^P) = 0(\frac{5}{2}^-)$  Status: \*\*\*\*

For results published before 1973 (they are now obsolete), see our 1982 edition Physics Letters **111B** 1 (1982).

The best evidence for this resonance is in the  $\Sigma\pi$  channel.

### $\Lambda(1830)$ POLE POSITION

#### REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$1899^{+35}_{-37}$	<sup>1</sup> KAMANO	15	DPWA Multichannel
$1766^{+37}_{-34}$	<sup>2</sup> KAMANO	15	DPWA Multichannel
1809	ZHANG	13A	DPWA Multichannel

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

<sup>1</sup> The preferred solution A in KAMANO 15 reports two poles. This entry is from the preferred solution A.

<sup>2</sup> From the preferred solution A in KAMANO 15. Not seen in solution B.

#### –2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$80^{+100}_{-34}$	<sup>1</sup> KAMANO	15	DPWA Multichannel
$212^{+94}_{-62}$	<sup>2</sup> KAMANO	15	DPWA Multichannel
109	ZHANG	13A	DPWA Multichannel

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

<sup>1</sup> The preferred solution A in KAMANO 15 reports two poles. This entry is from the preferred solution A.

<sup>2</sup> From the preferred solution A in KAMANO 15. Not seen in solution B.

### $\Lambda(1830)$ POLE RESIDUES

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

#### Normalized residue in $N\bar{K} \rightarrow \Lambda(1830) \rightarrow N\bar{K}$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.00502	–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 $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.00581	179	<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  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Lambda\eta$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.00941	-65	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Xi K$** 

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0477	94	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma(1385)\pi$ , *D*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0237	113	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma(1385)\pi$ , *G*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.000726	127	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow N\bar{K}^*(892)$ , *S=1/2*, *D*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0278	-177	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow N\bar{K}^*(892)$ , *S=3/2*, *D*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0255	3	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow N\bar{K}^*(892)$ , *S=3/2*, *G*-wave**

<u>MODULUS</u>	<u>PHASE (<math>^{\circ}</math>)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.00773	-17	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

**$\Lambda(1830)$  MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1810 to 1830 (<math>\approx</math> 1830) OUR ESTIMATE</b>			
1820 $\pm$ 4	ZHANG	13A	DPWA Multichannel
1831 $\pm$ 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1825 $\pm$ 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
1825 $\pm$ 1	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1817 or 1818	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
<sup>1</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.			

 **$\Lambda(1830)$  WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>60 to 110 (<math>\approx</math> 95) OUR ESTIMATE</b>			
114 $\pm$ 10	ZHANG	13A	DPWA Multichannel
100 $\pm$ 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
94 $\pm$ 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
119 $\pm$ 3	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
56 or 56	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
<sup>1</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.			

 **$\Lambda(1830)$  DECAY MODES**

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\bar{K}$	3–10 %
$\Gamma_2$ $\Sigma \pi$	35–75 %
$\Gamma_3$ $\Xi K$	
$\Gamma_4$ $\Sigma(1385)\pi$	>15 %
$\Gamma_5$ $\Sigma(1385)\pi$ , <i>D</i> -wave	(52 $\pm$ 6) %
$\Gamma_6$ $\Sigma(1385)\pi$ , <i>G</i> -wave	
$\Gamma_7$ $\Lambda\eta$	
$\Gamma_8$ $N\bar{K}^*(892)$ , <i>S</i> =1/2, <i>D</i> -wave	
$\Gamma_9$ $N\bar{K}^*(892)$ , <i>S</i> =3/2, <i>D</i> -wave	
$\Gamma_{10}$ $N\bar{K}^*(892)$ , <i>S</i> =3/2, <i>G</i> -wave	

 **$\Lambda(1830)$  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>0.03 to 0.10 OUR ESTIMATE</b>			
0.041 $\pm$ 0.005	ZHANG	13A	DPWA Multichannel
0.08 $\pm$ 0.03	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.02 $\pm$ 0.02	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$

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

0.006	<sup>1</sup> KAMANO	15	DPWA	Multichannel
0.04 ± 0.03	GOPAL	77	DPWA	See GOPAL 80
0.04 or 0.04	<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.

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

VALUE DOCUMENT ID TECN COMMENT

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

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

$\Gamma(\Xi K)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$

VALUE DOCUMENT ID TECN COMMENT

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

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

$\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_5/\Gamma$

VALUE DOCUMENT ID TECN COMMENT

<b>0.52 ± 0.06</b>	ZHANG	13A	DPWA	Multichannel
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• • • We do not use the following data for averages, fits, limits, etc. • • •

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

$\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$   $\Gamma_7/\Gamma$

VALUE DOCUMENT ID TECN COMMENT

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

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

$\Gamma(N\bar{K}^*(892), S=1/2, D\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$

VALUE DOCUMENT ID TECN COMMENT

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

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

$\Gamma(N\bar{K}^*(892), S=3/2, D\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_9/\Gamma$

VALUE DOCUMENT ID TECN COMMENT

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

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

$\Gamma(N\bar{K}^*(892), S=3/2, G\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_{10}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

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

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma\pi$   $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
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−0.13±0.01	ZHANG	13A	DPWA Multichannel
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−0.17±0.03	GOPAL	77	DPWA $\bar{K}N$ multichannel
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−0.15±0.01	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

−0.17 or −0.17	<sup>1</sup> MARTIN	77	DPWA $\bar{K}N$ multichannel
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<sup>1</sup> The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Sigma(1385)\pi$   $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
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+0.141±0.014	<sup>1</sup> CAMERON	78	DPWA $K^-p \rightarrow \Sigma(1385)\pi$
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+0.13 ±0.03	PREVOST	74	DPWA $K^-N \rightarrow \Sigma(1385)\pi$
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<sup>1</sup> The CAMERON 78 upper limit on G-wave decay is 0.03. The published sign has been changed to be in accord with the baryon-first convention.

 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(1830) \rightarrow \Lambda\eta$   $(\Gamma_1\Gamma_7)^{1/2}/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
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−0.044±0.020	RADER	73	MPWA
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 **$\Lambda(1830)$  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)
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, CIT, CERN)
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
CAMERON	78	NP B143 189	W. Cameron <i>et al.</i>	(RHEL, LOIC) 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
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP
PREVOST	74	NP B69 246	J. Prevost <i>et al.</i>	(SACL, CERN, HEID)
RADER	73	NC 16A 178	R.K. Rader <i>et al.</i>	(SACL, HEID, CERN+)