

$\Lambda(1830) \ 5/2^-$ $I(J^P) = 0(\frac{5}{2}^-)$ 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}	¹ KAMANO	15	DPWA Multichannel
1766^{+37}_{-34}	² KAMANO	15	DPWA Multichannel
1809	ZHANG	13A	DPWA Multichannel

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

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

² From the preferred solution A in KAMANO 15. Not seen in solution B.

-2xIMAGINARY PART

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

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

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

² 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	¹ KAMANO	15	DPWA Multichannel

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

¹ 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	¹ KAMANO	15	DPWA Multichannel

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

¹ 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 ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

<u>MODULUS</u>	<u>PHASE ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From 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 ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From 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 ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From 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 ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From 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 ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From 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 ($^{\circ}$)</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	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15. **$\Lambda(1830)$ MASS**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1810 to 1830 (≈ 1830) OUR ESTIMATE			
1820 ± 4	ZHANG	13A	DPWA Multichannel
1831 ± 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
1825 ± 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
1825 ± 1	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1817 or 1818	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. **$\Lambda(1830)$ WIDTH**

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
60 to 110 (≈ 95) OUR ESTIMATE			
114 ± 10	ZHANG	13A	DPWA Multichannel
100 ± 10	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
94 ± 10	GOPAL	77	DPWA $\bar{K}N$ multichannel
119 ± 3	KANE	74	DPWA $K^- p \rightarrow \Sigma \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
56 or 56	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel

¹The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. **$\Lambda(1830)$ DECAY MODES**

Mode	Fraction (Γ_i/Γ)
Γ_1 $N\bar{K}$	3–10 %
Γ_2 $\Sigma \pi$	35–75 %
Γ_3 ΞK	
Γ_4 $\Sigma(1385)\pi$	>15 %
Γ_5 $\Sigma(1385)\pi$, <i>D</i> -wave	(52±6) %
Γ_6 $\Sigma(1385)\pi$, <i>G</i> -wave	
Γ_7 $\Lambda\eta$	
Γ_8 $N\bar{K}^*(892)$, <i>S</i> =1/2, <i>D</i> -wave	
Γ_9 $N\bar{K}^*(892)$, <i>S</i> =3/2, <i>D</i> -wave	
Γ_{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 Λ and Σ Resonances.

 $\Gamma(N\bar{K})/\Gamma_{\text{total}}$ Γ_1/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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0.03 to 0.10 OUR ESTIMATE

0.041 ± 0.005	ZHANG	13A	DPWA Multichannel
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0.08 ± 0.03	GOPAL	80	DPWA $\bar{K}N \rightarrow \bar{K}N$
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0.02 ± 0.02	ALSTON-...	78	DPWA $\bar{K}N \rightarrow \bar{K}N$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.006	¹ KAMANO	15	DPWA Multichannel
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0.04 ± 0.03	GOPAL	77	DPWA See GOPAL 80
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0.04 or 0.04	² MARTIN	77	DPWA $\bar{K}N$ multichannel
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¹From the preferred solution A in KAMANO 15.

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

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

<u>VALUE</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. • • •

0.017	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

 $\Gamma(\Xi K)/\Gamma_{\text{total}}$ Γ_3/Γ

<u>VALUE</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. • • •

0.562	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

 $\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_5/Γ

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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0.52 ± 0.06	ZHANG	13A	DPWA Multichannel
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.134	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

 $\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$ Γ_7/Γ

<u>VALUE</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. • • •

0.024	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

 $\Gamma(N\bar{K}^*(892), S=1/2, D\text{-wave})/\Gamma_{\text{total}}$ Γ_8/Γ

<u>VALUE</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. • • •

0.134	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

$\Gamma(N\bar{K}^*(892), S=3/2, D\text{-wave})/\Gamma_{\text{total}}$ Γ_9/Γ

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

0.115	¹ KAMANO	15	DPWA Multichannel
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¹From the preferred solution A in KAMANO 15.

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

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

0.009	¹ KAMANO	15	DPWA Multichannel
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¹From 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
-0.17 ± 0.03	GOPAL	77	DPWA $\bar{K}N$ multichannel
-0.15 ± 0.01	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$

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

-0.17 or -0.17	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
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¹The 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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$+0.141 \pm 0.014$	¹ CAMERON	78	DPWA $K^-p \rightarrow \Sigma(1385)\pi$
$+0.13 \pm 0.03$	PREVOST	74	DPWA $K^-N \rightarrow \Sigma(1385)\pi$

¹The 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>	(HELSE, 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+)