NODE=B039

$\Lambda(1820)\ 5/2^+$

$I(J^P) = 0(\frac{5}{2}^+)$ Status: ∗∗∗∗

NODE=B039

This resonance is the cornerstone for all partial-wave analyses in this region. Most of the results published before 1973 are now obsolete and have been omitted. They may be found in our 1982 edition Physics Letters **111B** 1 (1982).

$\Lambda(1820)$ POLE POSITION

NODE=B039225

REAL PART

NODE=B039RE
NODE=B039RE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1812 to 1825 (≈ 1818) OUR ESTIMATE				
1813 ± 3	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1824^{+2}_{-1}	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1814	ZHANG	13A	DPWA	$\overline{K}N$ multichannel

→ UNCHECKED ←

OCCUR=3

[1] From the preferred solution A in KAMANO 15.

NODE=B039RE;LINKAGE=A

−2×IMAGINARY PART

NODE=B039IM
NODE=B039IM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
75 to 80 (≈ 77) OUR ESTIMATE				
78 ± 7	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
77 ± 2	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
85	ZHANG	13A	DPWA	$\overline{K}N$ multichannel

→ UNCHECKED ←

[1] From the preferred solution A in KAMANO 15.

NODE=B039IM;LINKAGE=A

$\Lambda(1820)$ POLE RESIDUES

NODE=B039250

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

NODE=B039250

Normalized residue in $N\overline{K} \rightarrow \Lambda(1820) \rightarrow N\overline{K}$

NODE=B039A00
NODE=B039A00

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.60 ±0.12	**−22 ± 5**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.558	−13	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A00;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Lambda(1820) \rightarrow \Sigma\pi$

NODE=B039A01
NODE=B039A01

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.34 ±0.07	**174 ± 5**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.357	168	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A01;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Lambda(1820) \rightarrow \Lambda\eta$

NODE=B039A02
NODE=B039A02

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0184	−3	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A02;LINKAGE=A

Normalized residue in $N\overline{K} \rightarrow \Lambda(1820) \rightarrow \Xi K$

NODE=B039A03
NODE=B039A03

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
∼ 0		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00111	70	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A03;LINKAGE=A

Normalized residue in $N\overline{K} \to \Lambda(1820) \to \Sigma(1385)\pi$, P-wave

NODE=B039A04
NODE=B039A04

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.07 ±0.02	**−60 ± 50**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.340	161	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A04;LINKAGE=A

Normalized residue in $N\overline{K} \to \Lambda(1820) \to \Sigma(1385)\pi$, F-wave

NODE=B039A05
NODE=B039A05

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.11 ±0.04	**5 ± 45**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.201	151	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A05;LINKAGE=A

Normalized residue in $N\overline{K} \to \Lambda(1820) \to N\overline{K}^*(892)$, S=1/2 , F-wave

NODE=B039A06
NODE=B039A06

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.02 ±0.02		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00750	41	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A06;LINKAGE=A

Normalized residue in $N\overline{K} \to \Lambda(1820) \to N\overline{K}^*(892)$, S=3/2 , P-wave

NODE=B039A07
NODE=B039A07

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.35 ±0.15	**−30 ± 45**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.171	−139	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A07;LINKAGE=A

Normalized residue in $N\overline{K} \to \Lambda(1820) \to N\overline{K}^*(892)$, S=3/2 , F-wave

NODE=B039A08
NODE=B039A08

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
0.02 ±0.02		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.000517	161	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039A08;LINKAGE=A

$\Lambda(1820)$ MASS

NODE=B039M

NODE=B039M

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1815 to 1825 (≈ 1820) OUR ESTIMATE				
1822 ±4	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
1823.5±0.8	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
1823 ±3	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
1819 ±2	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
1821 ±2	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1830	DECLAIS	77	DPWA	$\overline{K}N \to \overline{K}N$
1822 ±2	GOPAL	77	DPWA	$\overline{K}N$ multichannel
1817 or 1819	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel

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

NODE=B039;LINKAGE=A

$\Lambda(1820)$ WIDTH

NODE=B039W

NODE=B039W

→ UNCHECKED ←

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
70 to 90 (≈ 80) OUR ESTIMATE				
80±8	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
89±2	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
77±5	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
72±5	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
87±3	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
82	DECLAIS	77	DPWA	$\overline{K}N \to \overline{K}N$
81±5	GOPAL	77	DPWA	$\overline{K}N$ multichannel
76 or 76	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel

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

NODE=B039W;LINKAGE=A

$\Lambda(1820)$ DECAY MODES

NODE=B039215;NODE=B039

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\overline{K}$	55–65 %	DESIG=1;OUR EST
Γ_2	$\Sigma\pi$	8–14 %	DESIG=2;OUR EST
Γ_3	$\Sigma(1385)\pi$	5–10 %	DESIG=7;OUR EST
Γ_4	$\Sigma(1385)\pi$, P-wave		DESIG=5
Γ_5	$\Sigma(1385)\pi$, F-wave	(2.0±1.0) %	DESIG=6
Γ_6	$\Lambda\eta$		DESIG=4
Γ_7	ΞK		DESIG=11
Γ_8	$\Sigma\pi\pi$		DESIG=3
Γ_9	$N\overline{K}^*(892)$, S=1/2, F-wave		DESIG=9
Γ_{10}	$N\overline{K}^*(892)$, S=3/2, P-wave	(3.0±1.0) %	DESIG=8
Γ_{11}	$N\overline{K}^*(892)$, S=3/2, F-wave		DESIG=10

$\Lambda(1820)$ BRANCHING RATIOS

NODE=B039220

Errors quoted do not include uncertainties in the parametrizations used in the partial-wave analyses and are thus too small. See also "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

NODE=B039220

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

NODE=B039R1
NODE=B039R1

VALUE	DOCUMENT ID		TECN	COMMENT
0.55 to 0.65 OUR ESTIMATE				
0.58 ±0.12	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
0.54 ±0.01	ZHANG	13A	DPWA	$\overline{K}N$ multichannel
0.58 ±0.02	GOPAL	80	DPWA	$\overline{K}N \to \overline{K}N$
0.60 ±0.03	ALSTON-...	78	DPWA	$\overline{K}N \to \overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.547	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel
0.51	DECLAIS	77	DPWA	$\overline{K}N \to \overline{K}N$
0.57 ±0.02	GOPAL	77	DPWA	See GOPAL 80
0.59 or 0.58	[2] MARTIN	77	DPWA	$\overline{K}N$ multichannel

→ UNCHECKED ←

[1] From the preferred solution A in KAMANO 15. NODE=B039R1;LINKAGE=A

[2] The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. NODE=B039R1;LINKAGE=B

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

NODE=B039R04
NODE=B039R04

VALUE	DOCUMENT ID		TECN	COMMENT
0.19 ±0.04	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.218	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15. NODE=B039R04;LINKAGE=A

$\Gamma(\Sigma(1385)\pi, P\text{-wave})/\Gamma_{total}$ Γ_4/Γ

NODE=B039R08
NODE=B039R08

VALUE	DOCUMENT ID		TECN	COMMENT
~ 0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.173	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15. NODE=B039R08;LINKAGE=A

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

NODE=B039R09
NODE=B039R09

VALUE	DOCUMENT ID		TECN	COMMENT
0.02 ±0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.055	[1] KAMANO	15	DPWA	$\overline{K}N$ multichannel

[1] From the preferred solution A in KAMANO 15. NODE=B039R09;LINKAGE=A

$\Gamma(\Lambda\eta)/\Gamma_{total}$ Γ_6/Γ

NODE=B039R05
NODE=B039R05

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.001	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. NODE=B039R05;LINKAGE=A

$\Gamma(\Xi K)/\Gamma_{total}$ — Γ_7/Γ

NODE=B039R03
NODE=B039R03

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039R03;LINKAGE=A

$\Gamma(\Sigma\pi\pi)/\Gamma_{total}$ — Γ_8/Γ

NODE=B039R5
NODE=B039R5

VALUE	DOCUMENT ID		TECN	COMMENT
no clear signal	[1] ARMENTEROS	68C	HDBC	$K^- N \to \Sigma\pi\pi$

[1] There is a suggestion of a bump, enough to be consistent with what is expected from $\Sigma(1385) \to \Sigma\pi$ decay.

NODE=B039;LINKAGE=C

$\Gamma(N\overline{K}^*(892), S=1/2, F\text{-wave})/\Gamma_{total}$ — Γ_9/Γ

NODE=B039R00
NODE=B039R00

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039R00;LINKAGE=A

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

NODE=B039R01
NODE=B039R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.03 ±0.01	ZHANG	13A	DPWA	Multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.006	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039R01;LINKAGE=A

$\Gamma(N\overline{K}^*(892), S=3/2, F\text{-wave})/\Gamma_{total}$ — Γ_{11}/Γ

NODE=B039R02
NODE=B039R02

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
not seen	[1] KAMANO	15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15.

NODE=B039R02;LINKAGE=A

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1820) \to \Sigma\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

NODE=B039R2
NODE=B039R2

VALUE	DOCUMENT ID		TECN	COMMENT
-0.28 ± 0.01	ZHANG	13A	DPWA	Multichannel
-0.28 ± 0.03	GOPAL	77	DPWA	$\overline{K}N$ multichannel
-0.28 ± 0.01	KANE	74	DPWA	$K^- p \to \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-0.25 or -0.25	[1] MARTIN	77	DPWA	$\overline{K}N$ multichannel

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

NODE=B039R2;LINKAGE=A

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1820) \to \Sigma(1385)\pi$, P-wave — $(\Gamma_1\Gamma_4)^{1/2}/\Gamma$

NODE=B039R6
NODE=B039R6

VALUE	DOCUMENT ID		TECN	COMMENT
$-0.20\ \pm0.02$	ZHANG	13A	DPWA	Multichannel
-0.167 ± 0.054	[1] CAMERON	78	DPWA	$K^- p \to \Sigma(1385)\pi$
$+0.27\ \pm0.03$	PREVOST	74	DPWA	$K^- N \to \Sigma(1385)\pi$

[1] The published sign has been changed to be in accord with the baryon-first convention.

NODE=B039R6;LINKAGE=E

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1820) \to \Sigma(1385)\pi$, F-wave — $(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

NODE=B039R7
NODE=B039R7

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.065\pm0.029$	[1] CAMERON	78	DPWA	$K^- p \to \Sigma(1385)\pi$

[1] The published sign has been changed to be in accord with the baryon-first convention.

NODE=B039;LINKAGE=E

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(1820) \to \Lambda\eta$ — $(\Gamma_1\Gamma_6)^{1/2}/\Gamma$

NODE=B039R3
NODE=B039R3

VALUE	DOCUMENT ID		TECN
$-0.096^{+0.040}_{-0.020}$	RADER	73	MPWA

Λ(1820) REFERENCES

NODE=B039

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=59986
KAMANO	15	PR C92 025205	H. Kamano *et al.*	(ANL, OSAK)	REFID=57507
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)	REFID=55441
PDG	82	PL 111B 1	M. Roos *et al.*	(HELS, CIT, CERN)	REFID=41167
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL) IJP	REFID=31755
ALSTON-...	78	PR D18 182	M. Alston-Garnjost *et al.*	(LBL, MTHO+) IJP	REFID=31751
Also		PRL 38 1007	M. Alston-Garnjost *et al.*	(LBL, MTHO+) IJP	REFID=31752
CAMERON	78	NP B143 189	W. Cameron *et al.*	(RHEL, LOIC) IJP	REFID=31837
DECLAIS	77	CERN 77-16	Y. Declais *et al.*	(CAEN, CERN) IJP	REFID=31885
GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(LOIC, RHEL) IJP	REFID=31750
MARTIN	77	NP B127 349	B.R. Martin, M.K. Pidcock, R.G. Moorhouse	(LOUC+) IJP	REFID=31762
Also		NP B126 266	B.R. Martin, M.K. Pidcock	(LOUC)	REFID=31763
Also		NP B126 285	B.R. Martin, M.K. Pidcock	(LOUC) IJP	REFID=31764
KANE	74	LBL-2452	D.F. Kane	(LBL) IJP	REFID=31759
PREVOST	74	NP B69 246	J. Prevost *et al.*	(SACL, CERN, HEID)	REFID=31785
RADER	73	NC 16A 178	R.K. Rader *et al.*	(SACL, HEID, CERN+)	REFID=31882
ARMENTEROS	68C	NP B8 216	R. Armenteros *et al.*	(CERN, HEID, SACL) I	REFID=31797