$\Lambda(2020)\ 7/2^+$

$I(J^P) = 0(\frac{7}{2}^+)$ Status: *

OMITTED FROM SUMMARY TABLE

In LITCHFIELD 71, need for the state rests solely on a possibly inconsistent polarization measurement at 1.784 GeV/c. HEMINGWAY 75 does not require this state. GOPAL 77 does not need it in either $N\overline{K}$ or $\Sigma\pi$. With new K^-n angular distributions included, DECLAIS 77 sees it. However, this and other new data are included in GOPAL 80 and the state is not required. BACCARI 77 weakly supports it.

$\Lambda(2020)$ POLE POSITION

REAL PART

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1757	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports M = 2041^{+80}_{-82} MeV.

−2×IMAGINARY PART

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
146	[1] KAMANO 15	DPWA	Multichannel

[1] From the preferred solution A in KAMANO 15. Solution B reports M = 238^{+114}_{-34} MeV.

$\Lambda(2020)$ POLE RESIDUES

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

Normalized residue in $N\overline{K} \rightarrow \Lambda(2020) \rightarrow N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.000145	−77	[1] KAMANO 15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \rightarrow \Lambda(2020) \rightarrow \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0112	120	[1] KAMANO 15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \rightarrow \Lambda(2020) \rightarrow \Lambda\eta$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.000786	−100	[1] KAMANO 15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \rightarrow \Lambda(2020) \rightarrow \Sigma(1385)\pi$, F-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.00451	−82	[1] KAMANO	15	DPWA	Multichannel

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

Normalized residue in $N\overline{K} \rightarrow \Lambda(2020) \rightarrow \Sigma(1385)\pi$, H-wave

MODULUS	PHASE (°)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.0000298	−128	[1] KAMANO	15	DPWA	Multichannel

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

$\Lambda(2020)$ MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
≈ 2020 OUR ESTIMATE				
2043±22	ZHANG	13A	DPWA	Multichannel
2140	BACCARI	77	DPWA	$K^- p \rightarrow \Lambda\omega$
2117	DECLAIS	77	DPWA	$\overline{K} N \rightarrow \overline{K} N$
2100±30	LITCHFIELD	71	DPWA	$K^- p \rightarrow \overline{K} N$
2020±20	BARBARO-...	70	DPWA	$K^- p \rightarrow \Sigma\pi$

$\Lambda(2020)$ WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
200±75	ZHANG	13A	DPWA	Multichannel
128	BACCARI	77	DPWA	$K^- p \rightarrow \Lambda\omega$
167	DECLAIS	77	DPWA	$\overline{K} N \rightarrow \overline{K} N$
120±30	LITCHFIELD	71	DPWA	$K^- p \rightarrow \overline{K} N$
160±30	BARBARO-...	70	DPWA	$K^- p \rightarrow \Sigma\pi$

$\Lambda(2020)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\overline{K}$	
Γ_2	$\Sigma\pi$	
Γ_3	$\Lambda\eta$	
Γ_4	$\Sigma(1385)\pi$, F-wave	
Γ_5	$\Sigma(1385)\pi$, H-wave	
Γ_6	$N\overline{K}^*(892)$, S=1/2, F-wave	
Γ_7	$N\overline{K}^*(892)$, S=3/2, F-wave	
Γ_8	$N\overline{K}^*(892)$, S=3/2, H-wave	
Γ_9	$\Lambda\omega$	
Γ_{10}	$N\overline{K}^*(892)$, S=1/2	(30±9) %

Λ(2020) BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.028±0.005	ZHANG	13A	DPWA	Multichannel
0.05	DECLAIS	77	DPWA	$\overline{K}N \to \overline{K}N$
0.05 ±0.02	LITCHFIELD	71	DPWA	$K^- p \to \overline{K}N$
• • • 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.

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.891	[1] KAMANO	15	DPWA	Multichannel

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

$\Gamma(\Lambda\eta)/\Gamma_{total}$ Γ_3/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.002	[1] KAMANO	15	DPWA	Multichannel

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

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

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.105	[1] KAMANO	15	DPWA	Multichannel

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

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

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.

$\Gamma(N\overline{K}^*(892)$, S=1/2, F-wave$)/\Gamma_{total}$ Γ_6/Γ

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.

$\Gamma(N\overline{K}^*(892), S{=}3/2, F\text{-wave})/\Gamma_{total}$ Γ_7/Γ

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.

$\Gamma(N\overline{K}^*(892), S{=}3/2, H\text{-wave})/\Gamma_{total}$ Γ_8/Γ

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.

$\Gamma(N\overline{K}^*(892), S{=}1/2)/\Gamma_{total}$ Γ_{10}/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
0.30±0.09	ZHANG	13A	DPWA	Multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2020) \to \Sigma\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
$+0.02\pm0.01$	ZHANG	13A	DPWA	Multichannel
-0.15 ± 0.02	BARBARO-...	70	DPWA	$K^- p \to \Sigma\pi$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Lambda(2020) \to \Lambda\omega$ $(\Gamma_1\Gamma_9)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		TECN	COMMENT
<0.05	BACCARI	77	DPWA	$K^- p \to \Lambda\omega$

$\Lambda(2020)$ REFERENCES

KAMANO	15	PR C92 025205	H. Kamano *et al.*	(ANL, OSAK)
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL)
BACCARI	77	NC 41A 96	B. Baccari *et al.*	(SACL, CDEF) IJP
DECLAIS	77	CERN 77-16	Y. Declais *et al.*	(CAEN, CERN) IJP
GOPAL	77	NP B119 362	G.P. Gopal *et al.*	(LOIC, RHEL)
HEMINGWAY	75	NP B91 12	R.J. Hemingway *et al.*	(CERN, HEIDH, MPIM) IJP
LITCHFIELD	71	NP B30 125	P.J. Litchfield *et al.*	(RHEL, CDEF, SACL) IJP
BARBARO-...	70	Duke Conf. 173	A. Barbaro-Galtieri	(LRL) IJP

Hyperon Resonances, 1970