

$\Lambda(2020) 7/2^+$  $I(J^P) = 0(\frac{7}{2}^+)$  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  $N\bar{K}$  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	<sup>1</sup> KAMANO	15	DPWA Multichannel
<sup>1</sup> 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	<sup>1</sup> KAMANO	15	DPWA Multichannel
<sup>1</sup> 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  $N\bar{K} \rightarrow \Lambda(2020) \rightarrow N\bar{K}$ 

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.000145	-77	<sup>1</sup> KAMANO	15	DPWA Multichannel
<sup>1</sup> From the preferred solution A in KAMANO 15.				

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0112	120	<sup>1</sup> KAMANO	15	DPWA Multichannel
<sup>1</sup> From the preferred solution A in KAMANO 15.				

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

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.000786	-100	<sup>1</sup> KAMANO	15	DPWA Multichannel
<sup>1</sup> From the preferred solution A in KAMANO 15.				

**Normalized residue in  $N\bar{K} \rightarrow \Lambda(2020) \rightarrow \Sigma(1385)\pi$ , *F*-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. • • •

0.00451       $-82$       <sup>1</sup>KAMANO      15      DPWA      Multichannel<sup>1</sup>From the preferred solution A in KAMANO 15.**Normalized residue in  $N\bar{K} \rightarrow \Lambda(2020) \rightarrow \Sigma(1385)\pi$ , *H*-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. • • •

0.0000298       $-128$       <sup>1</sup>KAMANO      15      DPWA      Multichannel<sup>1</sup>From the preferred solution A in KAMANO 15. **$\Lambda(2020)$  MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>\approx 2020</math> OUR ESTIMATE</b>			
$2043 \pm 22$	ZHANG	13A	DPWA Multichannel
2140	BACCARI	77	DPWA $K^- p \rightarrow \Lambda\omega$
2117	DECLAIS	77	DPWA $\bar{K}N \rightarrow \bar{K}N$
$2100 \pm 30$	LITCHFIELD	71	DPWA $K^- p \rightarrow \bar{K}N$
$2020 \pm 20$	BARBARO-...	70	DPWA $K^- p \rightarrow \Sigma\pi$

 **$\Lambda(2020)$  WIDTH**

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

 **$\Lambda(2020)$  DECAY MODES**

	<u>Mode</u>	<u>Fraction (<math>\Gamma_i/\Gamma</math>)</u>
$\Gamma_1$	$N\bar{K}$	
$\Gamma_2$	$\Sigma\pi$	
$\Gamma_3$	$\Lambda\eta$	
$\Gamma_4$	$\Sigma(1385)\pi$ , <i>F</i> -wave	
$\Gamma_5$	$\Sigma(1385)\pi$ , <i>H</i> -wave	
$\Gamma_6$	$N\bar{K}^*(892)$ , $S=1/2$ , <i>F</i> -wave	
$\Gamma_7$	$N\bar{K}^*(892)$ , $S=3/2$ , <i>F</i> -wave	
$\Gamma_8$	$N\bar{K}^*(892)$ , $S=3/2$ , <i>H</i> -wave	
$\Gamma_9$	$\Lambda\omega$	
$\Gamma_{10}$	$N\bar{K}^*(892)$ , $S=1/2$	$(30 \pm 9)\%$

**$\Lambda(2020)$  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>
0.028±0.005	ZHANG	13A	DPWA Multichannel
0.05	DECLAIS	77	DPWA $\bar{K}N \rightarrow \bar{K}N$
0.05 ±0.02	LITCHFIELD	71	DPWA $K^-p \rightarrow \bar{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.891	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

 **$\Gamma(\Lambda\eta)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.002	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

 **$\Gamma(\Sigma(1385)\pi, F\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_4/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.105	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

 **$\Gamma(N\bar{K}^*(892), S=1/2, F\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_6/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
not seen	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

 **$\Gamma(N\bar{K}^*(892), S=3/2, F\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_7/\Gamma$** 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.001	<sup>1</sup> KAMANO	15	DPWA Multichannel

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

$\Gamma(N\bar{K}^*(892), S=3/2, H\text{-wave})/\Gamma_{\text{total}}$   $\Gamma_8/\Gamma$

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

not seen	<sup>1</sup> KAMANO	15	DPWA Multichannel
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<sup>1</sup>From the preferred solution A in KAMANO 15.

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

VALUE	DOCUMENT ID	TECN	COMMENT
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0.30±0.09	ZHANG	13A	DPWA Multichannel
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$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(2020) \rightarrow \Sigma\pi$   $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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+0.02±0.01	ZHANG	13A	DPWA Multichannel
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−0.15±0.02	BARBARO-...	70	DPWA $K^-p \rightarrow \Sigma\pi$
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$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Lambda(2020) \rightarrow \Lambda\omega$   $(\Gamma_1\Gamma_9)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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$<0.05$	BACCARI	77	DPWA $K^-p \rightarrow \Lambda\omega$
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**$\Lambda(2020)$  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)
GOPAL	80	Toronto Conf. 159	G.P. Gopal	(RHEL)
BACCARI	77	NC 41A 96	B. Baccari <i>et al.</i>	(SACL, CDEF) IJP
DECLAIS	77	CERN 77-16	Y. Declais <i>et al.</i>	(CAEN, CERN) IJP
GOPAL	77	NP B119 362	G.P. Gopal <i>et al.</i>	(LOIC, RHEL)
HEMINGWAY	75	NP B91 12	R.J. Hemingway <i>et al.</i>	(CERN, HEIDH, MPIM) IJP
LITCHFIELD	71	NP B30 125	P.J. Litchfield <i>et al.</i>	(RHEL, CDEF, SACL) IJP
BARBARO-...	70	Duke Conf. 173	A. Barbaro-Galtieri	(LRL) IJP
Hyperon Resonances, 1970				