NODE=B032

$\Sigma(1620)\ 1/2^-$

$I(J^P) = 1(\frac{1}{2}^-)$ Status: $*$

OMITTED FROM SUMMARY TABLE

NODE=B032

The S_{11} state at 1697 MeV reported by VANHORN 75 is tentatively listed under the $\Sigma(1750)$. CARROLL 76 sees two bumps in the isospin-1 total cross section near this mass. GAO 12 sees no evidence for this resonance.

Production experiments are listed separately in the next entry.

$\Sigma(1620)$ POLE POSITION

NODE=B032225

REAL PART

NODE=B032RE
NODE=B032RE

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
1680±8	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1501	ZHANG	13A	DPWA	$\overline{K}N$ multichannel

−2×IMAGINARY PART

NODE=B032IM
NODE=B032IM

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
39±11	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
171	ZHANG	13A	DPWA	$\overline{K}N$ multichannel

$\Sigma(1620)$ POLE RESIDUE

NODE=B032250

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

NODE=B032250

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Sigma\pi$

NODE=B032A00
NODE=B032A00

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.14±0.03	**−90 ± 25**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Lambda\pi$

NODE=B032A01
NODE=B032A01

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.10±0.03	**75 ± 20**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Xi K$

NODE=B032A04
NODE=B032A04

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.02±0.01	**120 ± 20**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Lambda(1520)\pi$

NODE=B032A02
NODE=B032A02

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.12±0.05	**140 ± 40**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Sigma(1385)\pi$

NODE=B032A03
NODE=B032A03

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.015±0.010	**155 ± 40**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow N\overline{K}^*(892)$, S-wave

NODE=B032A05
NODE=B032A05

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.05±0.04		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow N\overline{K}^*(892)$, D-wave

NODE=B032A06
NODE=B032A06

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.01±0.01		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

Normalized residue in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow N\overline{K}$

NODE=B032A07
NODE=B032A07

MODULUS	*PHASE* (°)	*DOCUMENT ID*		*TECN*	*COMMENT*
0.11±0.03	**43 ± 20**	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Sigma(1620)$ MASS

NODE=B032M

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT	
1600 to 1650 (≈ 1620) OUR ESTIMATE						NODE=B032M → UNCHECKED ←
1681±6		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel	
1600±15		ZHANG	13A	DPWA	$\overline{K}N$ multichannel	
1600±6	[1]	MORRIS	78	DPWA	$K^- n \to \Lambda\pi^-$	
1608±5	[2]	CARROLL	76	DPWA	Isospin-1 total σ	
1630±10		LANGBEIN	72	IPWA	$\overline{K}N$ multichannel	
1620		KIM	71	DPWA	K-matrix analysis	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1633±10	[3]	CARROLL	76	DPWA	Isospin-1 total σ	OCCUR=2

Σ(1620) WIDTH

NODE=B032W

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT	
40 to 100 (≈ 70) OUR ESTIMATE						NODE=B032W → UNCHECKED ←
40±12		SARANTSEV	19	DPWA	$\overline{K}N$ multichannel	
400±152		ZHANG	13A	DPWA	$\overline{K}N$ multichannel	
87±19	[1]	MORRIS	78	DPWA	$K^- n \to \Lambda\pi^-$	
15	[2]	CARROLL	76	DPWA	Isospin-1 total σ	
65±20		LANGBEIN	72	IPWA	$\overline{K}N$ multichannel	
40		KIM	71	DPWA	K-matrix analysis	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
10	[3]	CARROLL	76	DPWA	Isospin-1 total σ	OCCUR=2

Σ(1620) DECAY MODES

NODE=B032215;NODE=B032

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$N\overline{K}$	0.10 to 0.60	DESIG=1
Γ_2	$\Lambda\pi$	(9.0 ±3.0) %	DESIG=3
Γ_3	$\Sigma\pi$	(17 ±5) %	DESIG=2
Γ_4	ΞK		DESIG=4
Γ_5	$\Lambda(1520)\pi$	(10 ±5) %	DESIG=5
Γ_6	$\Sigma(1385)\pi$		DESIG=6

Σ(1620) BRANCHING RATIOS

NODE=B032220

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

NODE=B032R1

VALUE	DOCUMENT ID		TECN	COMMENT	
0.10 to 0.60 OUR ESTIMATE					NODE=B032R1 → UNCHECKED ←
0.11±0.03	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel	
0.59±0.10	ZHANG	13A	DPWA	$\overline{K}N$ multichannel	
0.22±0.02	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel	
0.05	KIM	71	DPWA	K-matrix analysis	

$\Gamma(\Sigma\pi)/\Gamma_{total}$ Γ_3/Γ

NODE=B032R00
NODE=B032R00

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.05	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

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

NODE=B032R01
NODE=B032R01

VALUE	DOCUMENT ID		TECN	COMMENT
0.09±0.03	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Xi K)/\Gamma_{total}$ Γ_4/Γ

NODE=B032R02
NODE=B032R02

VALUE	DOCUMENT ID		TECN	COMMENT
~ 0	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Lambda(1520)\pi)/\Gamma_{total}$ Γ_5/Γ

NODE=B032R03
NODE=B032R03

VALUE	DOCUMENT ID		TECN	COMMENT
0.10±0.05	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$\Gamma(\Sigma(1385)\pi)/\Gamma_{total}$ Γ_6/Γ

NODE=B032R04
NODE=B032R04

VALUE	DOCUMENT ID		TECN	COMMENT
<0.01	SARANTSEV	19	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Lambda\pi$ $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

NODE=B032R3
NODE=B032R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.12±0.02	[1] MORRIS	78	DPWA	$K^- n \rightarrow \Lambda\pi^-$
not seen	BAILLON	75	IPWA	$\overline{K}N \rightarrow \Lambda\pi$
0.15	KIM	71	DPWA	K-matrix analysis

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Sigma(1620) \rightarrow \Sigma\pi$ $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B032R2
NODE=B032R2

VALUE	DOCUMENT ID		TECN	COMMENT
+0.32±0.03	ZHANG	13A	DPWA	Multichannel
not seen	HEPP	76B	DPWA	$K^- N \rightarrow \Sigma\pi$
+0.40±0.06	LANGBEIN	72	IPWA	$\overline{K}N$ multichannel
+0.08	KIM	71	DPWA	K-matrix analysis

Σ(1620) FOOTNOTES

NODE=B032

[1] MORRIS 78 obtains an equally good fit without including this resonance. NODE=B032;LINKAGE=C

[2] Total cross-section bump with $(J+1/2)$ Γ_{el} / Γ_{total} is 0.06 seen by CARROLL 76. NODE=B032;LINKAGE=A

[3] Total cross-section bump with $(J+1/2)$ Γ_{el} / Γ_{total} is 0.04 seen by CARROLL 76. NODE=B032;LINKAGE=B

Σ(1620) REFERENCES

NODE=B032

SARANTSEV	19	EPJ A55 180	A.V. Sarantsev *et al.*	(BONN, PNPI)	REFID=59986
ZHANG	13A	PR C88 035205	H. Zhang *et al.*	(KSU)	REFID=55441
GAO	12	PR C86 025201	P. Gao, J. Shi, B.S. Zou	(BHEP, BEIJT)	REFID=54341
Also		NP A867 41	P. Gao, B.S. Zou, A. Sibirtsev	(BHEP, BEIJT+)	REFID=53734
MORRIS	78	PR D17 55	W.A. Morris *et al.*	(FSU) IJP	REFID=32092
CARROLL	76	PRL 37 806	A.S. Carroll *et al.*	(BNL) I	REFID=31760
HEPP	76B	PL 65B 487	V. Hepp *et al.*	(CERN, HEIDH, MPIM) IJP	REFID=31761
BAILLON	75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHEL) IJP	REFID=32089
VANHORN	75	NP B87 145	A.J. van Horn	(LBL) IJP	REFID=32093
Also		NP B87 157	A.J. van Horn	(LBL) IJP	REFID=32094
LANGBEIN	72	NP B47 477	W. Langbein, F. Wagner	(MPIM) IJP	REFID=31758
KIM	71	PRL 27 356	J.K. Kim	(HARV) IJP	REFID=31740
Also		Duke Conf. 161	J.K. Kim	(HARV) IJP	REFID=31741

Hyperon Resonances, 1970