

$\Sigma(1670) \ 3/2^-$

$I(J^P) = 1(\frac{3}{2}^-)$ Status: ****

For most results published before 1974 (they are now obsolete), see our 1982 edition Physics Letters **111B** 1 (1982).

Results from production experiments are listed separately in the next entry.

$\Sigma(1670)$ POLE POSITION

REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
1655 to 1675 (≈ 1662) OUR ESTIMATE			
1661 ± 3	SARANTSEV	19	DPWA $\overline{K}N$ multichannel
1669^{+7}_{-7}	¹ KAMANO	15	DPWA $\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1674	ZHANG	13A	DPWA $\overline{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.			

−2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
45 to 65 (≈ 55) OUR ESTIMATE			
52 ± 6	SARANTSEV	19	DPWA $\overline{K}N$ multichannel
64^{+10}_{-14}	¹ KAMANO	15	DPWA $\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
54	ZHANG	13A	DPWA $\overline{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.			

$\Sigma(1670)$ POLE RESIDUES

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

Normalized residue in $N\overline{K} \rightarrow \Sigma(1670) \rightarrow N\overline{K}$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.10 $\pm$ 0.02	−31 $\pm$ 12	SARANTSEV	19	DPWA $\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.129	−20	¹ KAMANO	15	DPWA $\overline{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\overline{K} \rightarrow \Sigma(1670) \rightarrow \Sigma\pi$

MODULUS	PHASE (°)	DOCUMENT ID	TECN	COMMENT
0.25 $\pm$ 0.05	−25 $\pm$ 10	SARANTSEV	19	DPWA $\overline{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.249	−21	¹ KAMANO	15	DPWA $\overline{K}N$ multichannel
¹ From the preferred solution A in KAMANO 15.				

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda\pi$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.09 ± 0.03	−52 ± 12	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0818	−7	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15.**Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Xi K$**

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.02 ± 0.01	160 ± 20	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Sigma\sigma$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.08 ± 0.03	−25 ± 15	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Sigma(1385)\pi$, *S-wave*

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.228	167	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15.**Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Sigma(1385)\pi$, *D-wave***

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0915	141	KAMANO 15	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda(1405)\pi$

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.03 ± 0.02	160 ± 15	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda(1520)\pi$, *P-wave*

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.04 ± 0.02	120 ± 20	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda(1520)\pi$, *F-wave*

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.01 ± 0.01		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Delta\bar{K}$, *S-wave*

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.01 ± 0.01		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow N\bar{K}^*(892)$, *S=3/2, S-wave*

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.05 ± 0.03 @ 50 ± 60	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow N\bar{K}^*(892)$, *S=3/2, D-wave*

<u>MODULUS</u>	<u>PHASE (°)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.01 ± 0.01		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

Normalized residue in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow N\bar{K}^*(892)$, $S=1/2$, D -wave

<u>MODULUS</u>	<u>PHASE ($^\circ$)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.03$\pm$0.02		SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $\Sigma(1670)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1665 to 1685 (≈ 1675) OUR ESTIMATE			
1665 ± 3	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
1678 ± 2	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
1673 ± 1	GAO 12	DPWA	$\bar{K}N \rightarrow \Lambda\pi$
1665.1 $\pm$ 4.1	KOISO 85	DPWA	$K^-p \rightarrow \Sigma\pi$
1682 ± 5	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
1679 ± 10	ALSTON-... 78	DPWA	$\bar{K}N \rightarrow \bar{K}N$
1670 ± 5	GOPAL 77	DPWA	$\bar{K}N$ multichannel
1670 ± 6	HEPP 76B	DPWA	$K^-N \rightarrow \Sigma\pi$
1685 ± 20	BAILLON 75	IPWA	$\bar{K}N \rightarrow \Lambda\pi$
1659 $^{+12}_{-5}$	VANHORN 75	DPWA	$K^-p \rightarrow \Lambda\pi^0$
1670 ± 2	KANE 74	DPWA	$K^-p \rightarrow \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1667 or 1668	¹ MARTIN 77	DPWA	$\bar{K}N$ multichannel
1650	DEBELLEFON 76	IPWA	$K^-p \rightarrow \Lambda\pi^0$
1671 ± 3	PONTE 75	DPWA	$K^-p \rightarrow \Lambda\pi^0$ (sol. 1)
1655 ± 2	PONTE 75	DPWA	$K^-p \rightarrow \Lambda\pi^0$ (sol. 2)

¹ The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit. **$\Sigma(1670)$ WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
40 to 100 (≈ 70) OUR ESTIMATE			
54 ± 6	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
55 ± 4	ZHANG 13A	DPWA	$\bar{K}N$ multichannel
52 $^{+5}_{-2}$	GAO 12	DPWA	$\bar{K}N \rightarrow \Lambda\pi$
65.0 $\pm$ 7.3	KOISO 85	DPWA	$K^-p \rightarrow \Sigma\pi$
79 ± 10	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$
56 ± 20	ALSTON-... 78	DPWA	$\bar{K}N \rightarrow \bar{K}N$
50 ± 5	GOPAL 77	DPWA	$\bar{K}N$ multichannel
56 ± 3	HEPP 76B	DPWA	$K^-N \rightarrow \Sigma\pi$
85 ± 25	BAILLON 75	IPWA	$\bar{K}N \rightarrow \Lambda\pi$
32 ± 11	VANHORN 75	DPWA	$K^-p \rightarrow \Lambda\pi^0$
79 ± 6	KANE 74	DPWA	$K^-p \rightarrow \Sigma\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
46 or 46	¹ MARTIN 77	DPWA	$\bar{K}N$ multichannel
80	DEBELLEFON 76	IPWA	$K^-p \rightarrow \Lambda\pi^0$
44 ± 11	PONTE 75	DPWA	$K^-p \rightarrow \Lambda\pi^0$ (sol. 1)
76 ± 5	PONTE 75	DPWA	$K^-p \rightarrow \Lambda\pi^0$ (sol. 2)

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

Σ(1670) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$N\bar{K}$	0.06 to 0.12
Γ_2	$\Lambda\pi$	5–15 %
Γ_3	$\Sigma\pi$	30–60 %
Γ_4	$\Lambda\pi\pi$	
Γ_5	$\Sigma\pi\pi$	
Γ_6	$\Sigma\sigma$	$(7.0 \pm 3.0) \%$
Γ_7	$\Sigma(1385)\pi$	
Γ_8	$\Sigma(1385)\pi$, S -wave	
Γ_9	$\Sigma(1385)\pi$, D -wave	
Γ_{10}	$N\bar{K}^*(892)$, $S=1/2$, D -wave	
Γ_{11}	$N\bar{K}^*(892)$, $S=3/2$, S -wave	
Γ_{12}	$N\bar{K}^*(892)$, $S=3/2$, D -wave	
Γ_{13}	$\Lambda(1405)\pi$	
Γ_{14}	$\Lambda(1520)\pi$	

Σ(1670) 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
VALUE	DOCUMENT ID	TECN	COMMENT	
0.06 to 0.12 OUR ESTIMATE				
0.10 ± 0.02	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel	
0.062 ± 0.007	ZHANG 13A	DPWA	$\bar{K}N$ multichannel	
0.10 ± 0.03	GOPAL 80	DPWA	$\bar{K}N \rightarrow \bar{K}N$	
0.11 ± 0.03	ALSTON-... 78	DPWA	$\bar{K}N \rightarrow \bar{K}N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.121	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel	
0.08 ± 0.03	GOPAL 77	DPWA	See GOPAL 80	
0.07 or 0.07	² MARTIN 77	DPWA	$\bar{K}N$ multichannel	
¹ From the preferred solution A in KAMANO 15.				
² The two MARTIN 77 values are from a T-matrix pole and from a Breit-Wigner fit.				

$\Gamma(\Lambda\pi)/\Gamma_{\text{total}}$				Γ_2/Γ
VALUE	DOCUMENT ID	TECN	COMMENT	
0.09 ± 0.02	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.058	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel	
¹ From the preferred solution A in KAMANO 15.				

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

VALUE	DOCUMENT ID	TECN	COMMENT
0.70 ± 0.15	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.465	¹ KAMANO 15	DPWA	$\bar{K}N$ multichannel

¹From the preferred solution A in KAMANO 15. $\Gamma(\Lambda\pi\pi)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.11	ARMENTEROS68E	HBC	K^-p ($\Gamma_1=0.09$)

 $\Gamma(\Sigma\pi\pi)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.14	¹ ARMENTEROS68E	HBC	K^-p, K^-d ($\Gamma_1=0.09$)

¹Ratio only for $\Sigma 2\pi$ system in $I = 1$, which cannot be $\Sigma(1385)$. $\Gamma(\Sigma\sigma)/\Gamma_{\text{total}}$ Γ_6/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
0.07 ± 0.03	SARANTSEV 19	DPWA	$\bar{K}N$ multichannel

 $\Gamma(\Sigma(1385)\pi, S\text{-wave})/\Gamma_{\text{total}}$ Γ_8/Γ

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

¹From the preferred solution A in KAMANO 15. $\Gamma(\Sigma(1385)\pi, D\text{-wave})/\Gamma_{\text{total}}$ Γ_9/Γ

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

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=1/2, D\text{-wave})/\Gamma_{\text{total}}$ Γ_{10}/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

¹From the preferred solution A in KAMANO 15. $\Gamma(N\bar{K}^*(892), S=3/2, S\text{-wave})/\Gamma_{\text{total}}$ Γ_{11}/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

¹From the preferred solution A in KAMANO 15.

$\Gamma(N\bar{K}^*(892), S=3/2, D\text{-wave})/\Gamma_{\text{total}}$
 Γ_{12}/Γ

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

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

 $\Gamma(\Lambda(1405)\pi)/\Gamma_{\text{total}}$
 Γ_{13}/Γ

VALUE	DOCUMENT ID	TECN	COMMENT
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0.01 ± 0.01	SARANTSEV	19	DPWA $\bar{K}N$ multichannel
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• • • We do not use the following data for averages, fits, limits, etc. • • •

< 0.06	ARMENTEROS68E	HBC	K^-p, K^-d ($\Gamma_1=0.09$)
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 $\Gamma(\Lambda(1405)\pi)/\Gamma(\Sigma(1385)\pi)$
 Γ_{13}/Γ_7

VALUE	DOCUMENT ID	TECN	COMMENT
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0.23 ± 0.08	BRUCKER	70	DBC $K^-N \rightarrow \Sigma\pi\pi$
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 $(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda\pi$
 $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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+0.08 ± 0.01	ZHANG	13A	DPWA Multichannel
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+0.081 ^{+0.002} _{-0.004}	GAO	12	DPWA $\bar{K}N \rightarrow \Lambda\pi$
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+0.17 ± 0.03	¹ MORRIS	78	DPWA $K^-n \rightarrow \Lambda\pi^-$
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+0.13 ± 0.02	¹ MORRIS	78	DPWA $K^-n \rightarrow \Lambda\pi^-$
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+0.10 ± 0.02	GOPAL	77	DPWA $\bar{K}N$ multichannel
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+0.06 ± 0.02	BAILLON	75	IPWA $\bar{K}N \rightarrow \Lambda\pi$
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+0.09 ± 0.02	VANHORN	75	DPWA $K^-p \rightarrow \Lambda\pi^0$
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+0.018 ± 0.060	DEVENISH	74B	Fixed- t dispersion rel.
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• • • We do not use the following data for averages, fits, limits, etc. • • •

+0.08 or +0.08	² MARTIN	77	DPWA $\bar{K}N$ multichannel
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+0.05	DEBELLEFON	76	IPWA $K^-p \rightarrow \Lambda\pi^0$
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+0.08 ± 0.01	PONTE	75	DPWA $K^-p \rightarrow \Lambda\pi^0$ (sol. 1)
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+0.17 ± 0.01	PONTE	75	DPWA $K^-p \rightarrow \Lambda\pi^0$ (sol. 2)
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¹ Results are with and without an S_{11} $\Sigma(1620)$ in the fit.

² The 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 $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Sigma\pi$
 $(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
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+0.20 ± 0.01	ZHANG	13A	DPWA Multichannel
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+0.20 ± 0.02	KOISO	85	DPWA $K^-p \rightarrow \Sigma\pi$
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+0.21 ± 0.02	GOPAL	77	DPWA $\bar{K}N$ multichannel
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+0.20 ± 0.01	HEPP	76B	DPWA $K^-N \rightarrow \Sigma\pi$
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+0.21 ± 0.03	KANE	74	DPWA $K^-p \rightarrow \Sigma\pi$
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• • • We do not use the following data for averages, fits, limits, etc. • • •

+0.18 or +0.17	¹ MARTIN	77	DPWA $\bar{K}N$ multichannel
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¹ The 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 $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Sigma(1385)\pi$, S-wave	$(\Gamma_1 \Gamma_8)^{1/2} / \Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
$+0.11 \pm 0.03$	PREVOST 74	DPWA	$K^- N \rightarrow \Sigma(1385)\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.17 ± 0.02	¹ SIMS 68	DBC	$K^- N \rightarrow \Lambda \pi \pi$
¹ SIMS 68 uses only cross-section data. Result used as upper limit only.			

$\Gamma_i \Gamma_f / \Gamma_{\text{total}}^2$ in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda(1405)\pi$	$\Gamma_1 \Gamma_{13} / \Gamma^2$		
VALUE	DOCUMENT ID	TECN	COMMENT
0.007 ± 0.002	¹ BRUCKER 70	DBC	$K^- N \rightarrow \Sigma \pi \pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
< 0.03	BERLEY 69	HBC	$K^- p$ 0.6–0.82 GeV/c
¹ Assuming the $\Lambda(1405)\pi$ cross-section bump is due only to $3/2^-$ resonance.			

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1670) \rightarrow \Lambda(1520)\pi$	$(\Gamma_1 \Gamma_{14})^{1/2} / \Gamma$		
VALUE	DOCUMENT ID	TECN	COMMENT
0.081 ± 0.016	¹ CAMERON 77	DPWA	P-wave decay
¹ The CAMERON 77 upper limit on F-wave decay is 0.03.			

$\Sigma(1670)$ REFERENCES

SARANTSEV 19	EPJ A55 180	A.V. Sarantsev <i>et al.</i>	(BONN, PNPI)
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)
GAO 12	PR C86 025201	P. Gao, J. Shi, B.S. Zou	(BHEP, BEIJT)
Also	NP A867 41	P. Gao, B.S. Zou, A. Sibirtsev	(BHEP, BEIJT+)
KOISO 85	NP A433 619	H. Koiso <i>et al.</i>	(TOKY, MASA)
PDG 82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, 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
MORRIS 78	PR D17 55	W.A. Morris <i>et al.</i>	(FSU) IJP
CAMERON 77	NP B131 399	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) IJP
Also	NP B126 285	B.R. Martin, M.K. Pidcock	(LOUC) IJP
DEBELLEFON 76	NP B109 129	A. de Bellefon, A. Berthon	(CDEF) IJP
HEPP 76B	PL 65B 487	V. Hepp <i>et al.</i>	(CERN, HEIDH, MPIM) IJP
BAILLON 75	NP B94 39	P.H. Baillon, P.J. Litchfield	(CERN, RHEL) IJP
PONTE 75	PR D12 2597	R.A. Ponte <i>et al.</i>	(MASA, TENN, UCR) IJP
VANHORN 75	NP B87 145	A.J. van Horn	(LBL) IJP
Also	NP B87 157	A.J. van Horn	(LBL) IJP
DEVENISH 74B	NP B81 330	R.C.E. Devenish, C.D. Froggatt, B.R. Martin	(DESY+) IJP
KANE 74	LBL-2452	D.F. Kane	(LBL) IJP
PREVOST 74	NP B69 246	J. Prevost <i>et al.</i>	(SACL, CERN, HEID)
BRUCKER 70	Duke Conf. 155	E.B. Brucker <i>et al.</i>	(FSU) I
Hyperon Resonances, 1970			
BERLEY 69	PL 30B 430	D. Berley <i>et al.</i>	(BNL)
ARMENTEROS 68E	PL 28B 521	R. Armenteros <i>et al.</i>	(CERN, HEID, SACL) I
SIMS 68	PRL 21 1413	W.H. Sims <i>et al.</i>	(FSU, TUFTS, BRAN)