$\Sigma(1385)$ $3/2^+$

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

Discovered by ALSTON 60. Early measurements of the mass and width for combined charge states have been omitted. They may be found in our 1984 edition Reviews of Modern Physics **56** S1 (1984).

We average only the most significant determinations. We do not average results from inclusive experiments with large backgrounds or results which are not accompanied by some discussion of experimental resolution. Nevertheless systematic differences between experiments remain. (See the ideograms in the Listings below.) These differences could arise from interference effects that change with production mechanism and/or beam momentum. They can also be accounted for in part by differences in the parametrizations employed. (See BORENSTEIN 74 for a discussion on this point.) Thus BORENSTEIN 74 uses a Breit-Wigner with energy-independent width, since a *P*-wave was found to give unsatisfactory fits. CAMERON 78 uses the same form. On the other hand HOLMGREN 77 obtains a good fit to their $\Lambda\pi$ spectrum with a *P*-wave Breit-Wigner, but includes the partial width for the $\Sigma\pi$ decay mode in the parametrization. AGUILAR-BENITEZ 81D gives masses and widths for five different Breit-Wigner shapes. The results vary considerably. Only the best-fit *S*-wave results are given here.

$\Sigma(1385)$ POLE POSITIONS

$\Sigma(1385)^+$ REAL PART

VALUE	*DOCUMENT ID*	*COMMENT*
1379 ± 1	LICHTENBERG74	Extrapolates HABIBI 73

$\Sigma(1385)^+$ −IMAGINARY PART

VALUE	*DOCUMENT ID*	*COMMENT*
17.5 ± 1.5	LICHTENBERG74	Extrapolates HABIBI 73

$\Sigma(1385)^-$ REAL PART

VALUE	*DOCUMENT ID*	*COMMENT*
1383 ± 1	LICHTENBERG74	Extrapolates HABIBI 73

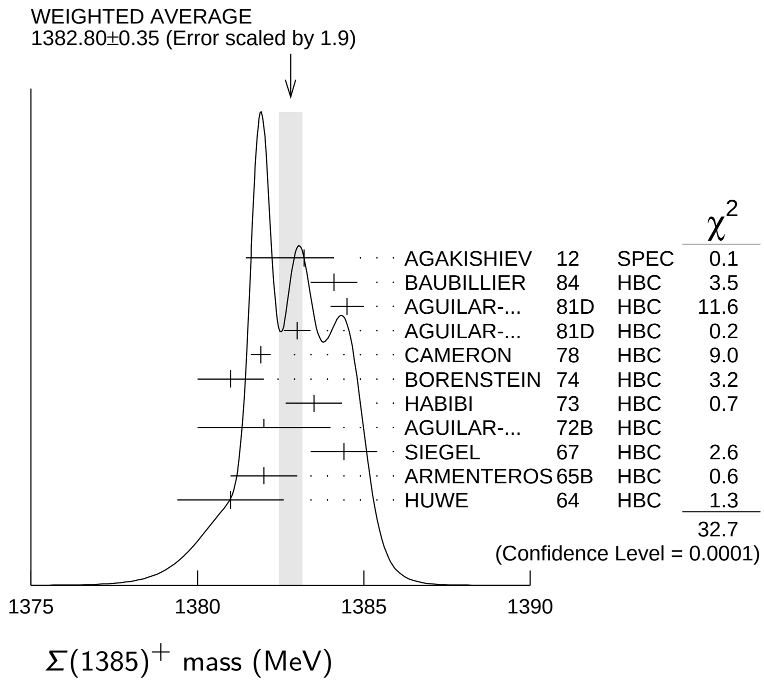
$\Sigma(1385)^-$ −IMAGINARY PART

VALUE	*DOCUMENT ID*	*COMMENT*
22.5 ± 1.5	LICHTENBERG74	Extrapolates HABIBI 73

$\Sigma(1385)$ MASSES

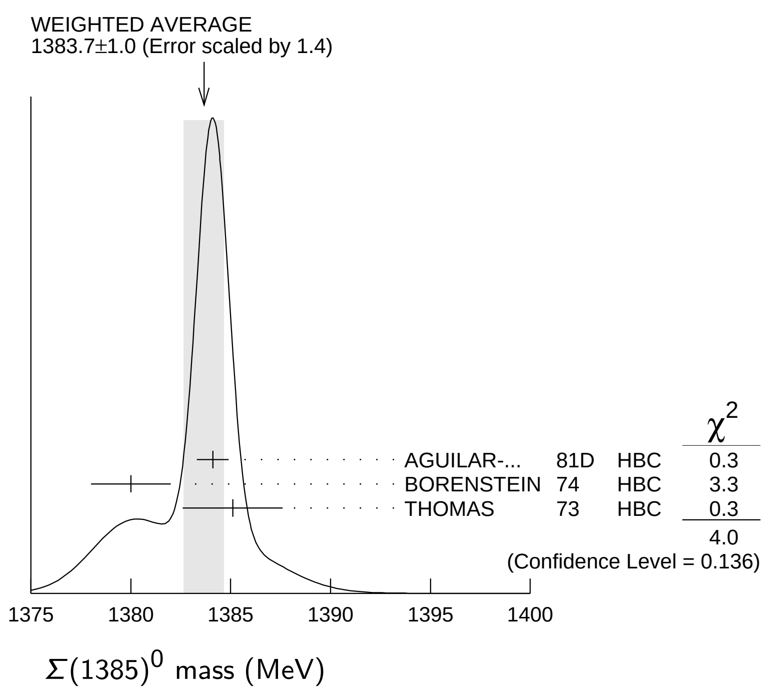
$\Sigma(1385)^+$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1382.80±0.35 OUR AVERAGE		Error includes scale factor of 1.9. See the ideogram below.			
1383.2 ±0.9 $^{+0.1}_{-1.5}$		AGAKISHIEV	12	SPEC	$p p \rightarrow \Sigma(1385)^+ K^+ n$, 3.5 GeV
1384.1 ±0.7	1897	BAUBILLIER	84	HBC	$K^- p$ 8.25 GeV/c
1384.5 ±0.5	5256	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda\pi\pi$ 4.2 GeV/c
1383.0 ±0.4	9361	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda 3\pi$ 4.2 GeV/c
1381.9 ±0.3	6900	CAMERON	78	HBC	$K^- p$ 0.96–1.36 GeV/c
1381 ±1	6846	BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c
1383.5 ±0.85	2300	HABIBI	73	HBC	$K^- p \rightarrow \Lambda\pi\pi$
1382 ±2	400	AGUILAR-...	72B	HBC	$K^- p \rightarrow \Lambda\pi$'s
1384.4 ±1.0	1260	SIEGEL	67	HBC	$K^- p$ 2.1 GeV/c
1382 ±1	750	ARMENTEROS	65B	HBC	$K^- p$ 0.9–1.2 GeV/c
1381.0 ±1.6	859	HUWE	64	HBC	$K^- p$ 1.22 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1385.1 ±1.2	600	BAKER	80	HYBR	$\pi^+ p$ 7 GeV/c
1383.2 ±1.0	750	BAKER	80	HYBR	$K^- p$ 7 GeV/c
1381 ±2	7k	[1] BAUBILLIER	79B	HBC	$K^- p$ 8.25 GeV/c
1391 ±2	2k	CAUTIS	79	HYBR	$\pi^+ p/K^- p$ 11.5 GeV
1390 ±2	100	[1] SUGAHARA	79B	HBC	$\pi^- p$ 6 GeV/c
1385 ±3	22k	[1,2] BARREIRO	77B	HBC	$K^- p$ 4.2 GeV/c
1385 ±1	2594	HOLMGREN	77	HBC	See AGUILAR-BENITEZ 81D
1380 ±2		[1] BARDADIN-...	75	HBC	$K^- p$ 14.3 GeV/c
1382 ±1	3740	[3] BERTHON	74	HBC	$K^- p$ 1263–1843 MeV/c
1390 ±6	46	AGUILAR-...	70B	HBC	$K^- p \rightarrow \Sigma\pi$'s 4 GeV/$c$
1383 ±8	62	[4] BIRMINGHAM	66	HBC	$K^- p$ 3.5 GeV/c
1378 ±5	135	LONDON	66	HBC	$K^- p$ 2.24 GeV/c
1384.3 ±1.9	250	[4] SMITH	65	HBC	$K^- p$ 1.8 GeV/c
1382.6 ±2.1	250	[4] SMITH	65	HBC	$K^- p$ 1.95 GeV/c
1375.0 ±3.9	170	COOPER	64	HBC	$K^- p$ 1.45 GeV/c
1376.0 ±3.9	154	[4] ELY	61	HLBC	$K^- p$ 1.11 GeV/c



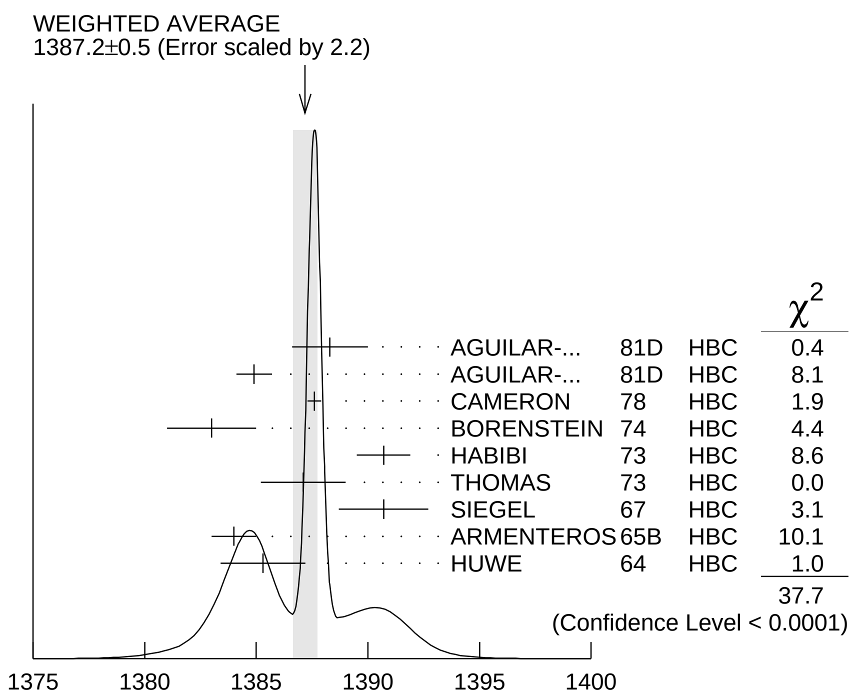
$\Sigma(1385)^0$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1383.7±1.0 OUR AVERAGE	Error includes scale factor of 1.4. See the ideogram below.				
1384.1±0.8	5722	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda 3\pi$ 4.2 GeV/c
1380 ±2	3100	[5] BORENSTEIN	74	HBC	$K^- p \rightarrow \Lambda 3\pi$ 2.18 GeV/c
1385.1±2.5	240	[4] THOMAS	73	HBC	$\pi^- p \rightarrow \Lambda \pi^0 K^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1389 ±3	500	[6] BAUBILLIER	79B	HBC	$K^- p$ 8.25 GeV/c



$\Sigma(1385)^-$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
1387.2±0.5 OUR AVERAGE		Error includes scale factor of 2.2. See the ideogram below.			
1388.3±1.7	620	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda\pi\pi$ 4.2 GeV/c
1384.9±0.8	3346	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda 3\pi$ 4.2 GeV/c
1387.6±0.3	9720	CAMERON	78	HBC	$K^- p$ 0.96–1.36 GeV/c
1383 ±2	2303	BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c
1390.7±1.2	1900	HABIBI	73	HBC	$K^- p \rightarrow \Lambda\pi\pi$
1387.1±1.9	630	[4] THOMAS	73	HBC	$\pi^- p \rightarrow \Lambda\pi^- K^+$
1390.7±2.0	370	SIEGEL	67	HBC	$K^- p$ 2.1 GeV/c
1384 ±1	1380	ARMENTEROS	65B	HBC	$K^- p$ 0.9–1.2 GeV/c
1385.3±1.9	1086	[4] HUWE	64	HBC	$K^- p$ 1.15–1.30 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1383 ±1	4.5k	[1] BAUBILLIER	79B	HBC	$K^- p$ 8.25 GeV/c
1380 ±6	150	[1] SUGAHARA	79B	HBC	$\pi^- p$ 6 GeV/c
1387 ±3	12k	[1,2] BARREIRO	77B	HBC	$K^- p$ 4.2 GeV/c
1391 ±3	193	HOLMGREN	77	HBC	See AGUILAR-BENITEZ 81D
1383 ±2		[1] BARDADIN-...	75	HBC	$K^- p$ 14.3 GeV/c
1389 ±1	3060	[3] BERTHON	74	HBC	$K^- p$ 1263–1843 MeV/c
1389 ±9	15	LONDON	66	HBC	$K^- p$ 2.24 GeV/c
1391.5±2.6	120	[4] SMITH	65	HBC	$K^- p$ 1.8 GeV/c
1399.8±2.2	58	[4] SMITH	65	HBC	$K^- p$ 1.95 GeV/c
1392.0±6.2	200	COOPER	64	HBC	$K^- p$ 1.45 GeV/c
1382 ±3	93	DAHL	61	DBC	$K^- d$ 0.45 GeV/c
1376.0±4.4	224	[4] ELY	61	HLBC	$K^- p$ 1.11 GeV/c



$\Sigma(1385)^-$ mass (MeV)

$m_{\Sigma(1385)^-} - m_{\Sigma(1385)^+}$

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
-2 to $+6$	95	[7] BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c
7.2 ± 1.4		[7] HABIBI	73	HBC	$K^- p \to \Lambda\pi\pi$
6.3 ± 2.0		[7] SIEGEL	67	HBC	$K^- p$ 2.1 GeV/c
11 ± 9		[7] LONDON	66	HBC	$K^- p$ 2.24 GeV/c
9 ± 6		LONDON	66	HBC	$\Lambda 3\pi$ events
2.0 ± 1.5		[7] ARMENTEROS	65B	HBC	$K^- p$ 0.9–1.2 GeV/c
7.2 ± 2.1		[7] SMITH	65	HBC	$K^- p$ 1.8 GeV/c
17.2 ± 2.0		[7] SMITH	65	HBC	$K^- p$ 1.95 GeV/c
17 ± 7		[7] COOPER	64	HBC	$K^- p$ 1.45 GeV/c
4.3 ± 2.2		[7] HUWE	64	HBC	$K^- p$ 1.22 GeV/c
0.0 ± 4.2		[7] ELY	61	HLBC	$K^- p$ 1.11 GeV/c

$m_{\Sigma(1385)^0} - m_{\Sigma(1385)^+}$

VALUE (MeV)	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
-4 to $+4$	95	[7] BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c

$m_{\Sigma(1385)^-} - m_{\Sigma(1385)^0}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.0 ± 2.4	[7] THOMAS	73	HBC	$\pi^- p \to \Lambda\pi^- K^+$

$\Sigma(1385)$ WIDTHS

$\Sigma(1385)^+$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
36.0± 0.7 OUR AVERAGE					
$40.2 \pm 2.1^{+1.2}_{-2.8}$		AGAKISHIEV	12	SPEC	$pp \to \Sigma(1385)^+ K^+ n$, 3.5 GeV
37.2 ± 2.0	1897	BAUBILLIER	84	HBC	$K^- p$ 8.25 GeV/c
35.1 ± 1.7	5256	AGUILAR-...	81D	HBC	$K^- p \to \Lambda\pi\pi$ 4.2 GeV/c
37.5 ± 2.0	9361	AGUILAR-...	81D	HBC	$K^- p \to \Lambda 3\pi$ 4.2 GeV/c
35.5 ± 1.9	6900	CAMERON	78	HBC	$K^- p$ 0.96–1.36 GeV/c
34.0 ± 1.6	6846	[8] BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c
38.3 ± 3.2	2300	[9] HABIBI	73	HBC	$K^- p \to \Lambda\pi\pi$
32.5 ± 6.0	400	AGUILAR-...	72B	HBC	$K^- p \to \Lambda\pi$'s
36 ± 4	1260	[9] SIEGEL	67	HBC	$K^- p$ 2.1 GeV/c
32.0 ± 4.7	750	[9] ARMENTEROS	65B	HBC	$K^- p$ 0.95–1.20 GeV/c
46.5 ± 6.4	859	[9] HUWE	64	HBC	$K^- p$ 1.15–1.30 GeV/c

• • • We do not use the following data for averages, fits, limits, etc. • • •

40 ± 3	600	BAKER	80	HYBR	$\pi^+ p$ 7 GeV/c
37 ± 2	750	BAKER	80	HYBR	$K^- p$ 7 GeV/c
37 ± 2	7k	[1] BAUBILLIER	79B	HBC	$K^- p$ 8.25 GeV/c
30 ± 4	2k	CAUTIS	79	HYBR	$\pi^+ p/K^- p$ 11.5 GeV
30 ± 6	100	[1] SUGAHARA	79B	HBC	$\pi^- p$ 6 GeV/c
43 ± 5	22k	[1,2] BARREIRO	77B	HBC	$K^- p$ 4.2 GeV/c
34 ± 2	2594	HOLMGREN	77	HBC	See AGUILAR-BENITEZ 81D
40.0± 3.2		[1] BARDADIN-...	75	HBC	$K^- p$ 14.3 GeV/c
48 ± 3	3740	[3] BERTHON	74	HBC	$K^- p$ 1263–1843 MeV/c
33 ±20	46	[9] AGUILAR-...	70B	HBC	$K^- p \rightarrow \Sigma\pi$'s 4 GeV/$c$
25 ±32	62	[9] BIRMINGHAM	66	HBC	$K^- p$ 3.5 GeV/c
30.3± 7.5	250	[9] SMITH	65	HBC	$K^- p$ 1.8 GeV/c
33.1± 8.3	250	[9] SMITH	65	HBC	$K^- p$ 1.95 GeV/c
51 ±16	170	[9] COOPER	64	HBC	$K^- p$ 1.45 GeV/c
48 ±16	154	[9] ELY	61	HLBC	$K^- p$ 1.11 GeV/c

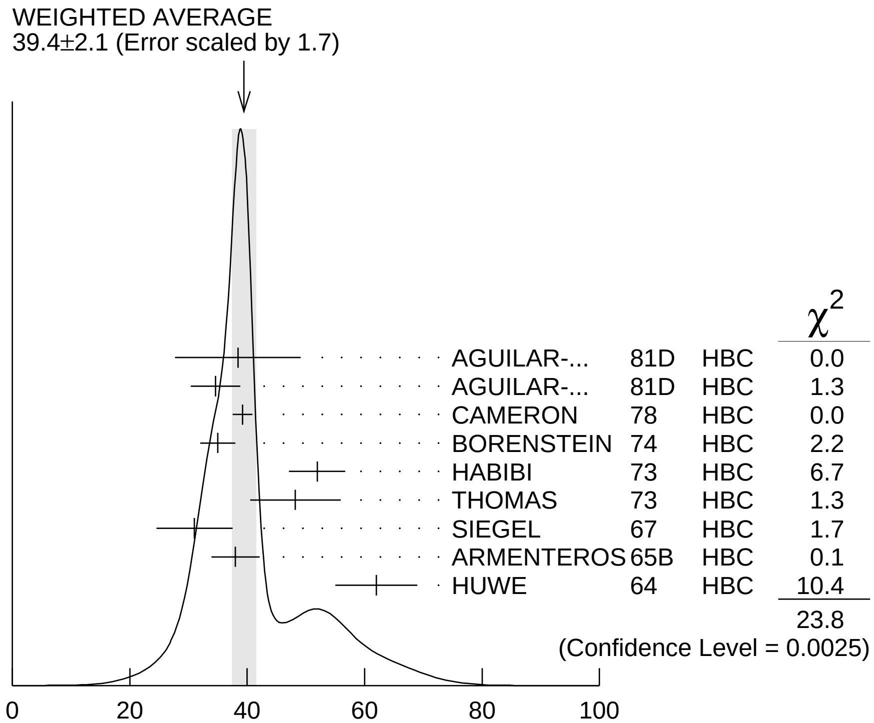
Σ(1385)^0 WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
36 ± 5 OUR AVERAGE					
34.8± 5.6	5722	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda 3\pi$ 4.2 GeV/c
39.3±10.2	240	[9] THOMAS	73	HBC	$\pi^- p \rightarrow \Lambda\pi^0 K^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
53 ± 8	3100	[10] BORENSTEIN	74	HBC	$K^- p \rightarrow \Lambda 3\pi$ 2.18 GeV/c
30 ± 9	106	CURTIS	63	OSPK	$\pi^- p$ 1.5 GeV/c

Σ(1385)$^-$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
39.4± 2.1 OUR AVERAGE	Error includes scale factor of 1.7. See the ideogram below.				
38.4±10.7	620	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda\pi\pi$ 4.2 GeV/c
34.6± 4.2	3346	AGUILAR-...	81D	HBC	$K^- p \rightarrow \Lambda 3\pi$ 4.2 GeV/c
39.2± 1.7	9720	CAMERON	78	HBC	$K^- p$ 0.96–1.36 GeV/c
35 ± 3	2303	[8] BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c
51.9± 4.8	1900	[9] HABIBI	73	HBC	$K^- p \rightarrow \Lambda\pi\pi$
48.2± 7.7	630	[9] THOMAS	73	HBC	$\pi^- p \rightarrow \Lambda\pi^- K^0$
31.0± 6.5	370	[9] SIEGEL	67	HBC	$K^- p$ 2.1 GeV/c
38.0± 4.1	1382	[9] ARMENTEROS	65B	HBC	$K^- p$ 0.95–1.20 GeV/c
62 ± 7	1086	HUWE	64	HBC	$K^- p$ 1.15–1.30 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
44 ± 4	4.5k	[1] BAUBILLIER	79B	HBC	$K^- p$ 8.25 GeV/c
58 ± 4	150	[1] SUGAHARA	79B	HBC	$\pi^- p$ 6 GeV/c
45 ± 5	12k	[1,2] BARREIRO	77B	HBC	$K^- p$ 4.2 GeV/c
35 ±10	193	HOLMGREN	77	HBC	See AGUILAR-BENITEZ 81D
47 ± 6		[1] BARDADIN-...	75	HBC	$K^- p$ 14.3 GeV/c
40 ± 3	3060	[3] BERTHON	74	HBC	$K^- p$ 1263–1843 MeV/c

29.2±10.6	120	[9] SMITH	65	HBC	$K^- p$ 1.80 GeV/c
17.1± 8.9	58	[9] SMITH	65	HBC	$K^- p$ 1.95 GeV/c
88 ±24	200	[9] COOPER	64	HBC	$K^- p$ 1.45 GeV/c
40		DAHL	61	DBC	$K^- d$ 0.45 GeV/c
66 ±18	224	[9] ELY	61	HLBC	$K^- p$ 1.11 GeV/c



$\Sigma(1385)^-$ width (MeV)

Σ(1385) DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\Lambda\pi$	(87.0 ± 1.5) %	
Γ_2	$\Sigma\pi$	(11.7 ± 1.5) %	
Γ_3	$\Lambda\gamma$	$(1.25^{+0.13}_{-0.12})$ %	
Γ_4	$\Sigma^+\gamma$	$(7.0 \pm 1.7) \times 10^{-3}$	
Γ_5	$\Sigma^-\gamma$	$< 2.4 \times 10^{-4}$	90%
Γ_6	$N\overline{K}$		

Σ(1385) BRANCHING RATIOS

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$ — Γ_2/Γ_1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.135±0.011 OUR AVERAGE					
0.20 ±0.06	DIONISI	78B	HBC	±	$K^- p \to Y^* K\overline{K}$
0.16 ±0.03	BERTHON	74	HBC	+	$K^- p$ 1.26–1.84 GeV/c
0.11 ±0.02	BERTHON	74	HBC	−	$K^- p$ 1.26–1.84 GeV/c

0.21 $\pm$0.05	BORENSTEIN	74	HBC	+	$K^- p \rightarrow \Lambda\pi^+\pi^-$, $\Sigma^0\pi^+\pi^-$
0.18 $\pm$0.04	MAST	73	MPWA	$\pm$	$K^- p \rightarrow \Lambda\pi^+\pi^-$, $\Sigma^0\pi^+\pi^-$
0.10 $\pm$0.05	THOMAS	73	HBC	−	$\pi^- p \rightarrow \Lambda K\pi$, $\Sigma K\pi$
0.16 $\pm$0.07	AGUILAR-...	72B	HBC	+	$K^- p$ 3.9, 4.6 GeV/c
0.13 $\pm$0.04	COLLEY	71B	DBC	−0	$K^- N$ 1.5 GeV/c
0.13 $\pm$0.04	PAN	69	HBC	+	$\pi^+ p \rightarrow \Lambda K\pi$, $\Sigma K\pi$
0.08 $\pm$0.06	LONDON	66	HBC	+	$K^- p$ 2.24 GeV/c
0.163$\pm$0.041	ARMENTEROS	65B	HBC	$\pm$	$K^- p$ 0.95–1.20 GeV/c
0.09 $\pm$0.04	HUWE	64	HBC	$\pm$	$K^- p$ 1.2–1.7 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.04	ALSTON	62	HBC	$\pm$0	$K^- p$ 1.15 GeV/c
0.04 $\pm$0.04	BASTIEN	61	HBC	$\pm$	

$\Gamma(\Lambda\gamma)/\Gamma(\Lambda\pi)$ — Γ_3/Γ_1

This ratio is of course for $\Sigma(1385)^0 \rightarrow \Lambda\gamma$ and $\Lambda\pi^0$.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.43^{+0.15}_{-0.13}$ OUR AVERAGE					
$1.42\pm0.12^{+0.11}_{-0.07}$	624 $\pm$ 25	KELLER	11	CLAS	$\gamma p \rightarrow K^+\Lambda\gamma$, E_γ 1.6–3.8 GeV
$1.53\pm0.39^{+0.15}_{-0.24}$	61	TAYLOR	05	CLAS	$\gamma p \rightarrow K^+\Lambda\gamma$

$\Gamma(\Sigma^+\gamma)/\Gamma(\Sigma\pi)$ — Γ_4/Γ_2

This ratio is for $\Sigma(1385)^+ \rightarrow \Sigma^+\gamma$ over $\Sigma(1385)^+ \rightarrow \Sigma\pi$.

VALUE (%)	DOCUMENT ID		TECN	COMMENT
$5.98\pm1.11^{+0.27}_{-0.61}$	[11] KELLER	12	CLAS	$\gamma p \rightarrow K^0\Sigma(1385)^+$

$\Gamma(\Sigma^-\gamma)/\Gamma_{total}$ — Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
$<2.4 \times 10^{-4}$	90	[12] MOLCHANOV	04	SELX	−	Σ^- Pb $\rightarrow \Sigma(1385)^-$ Pb, 600 GeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$<6.1 \times 10^{-4}$	90	[13] ARIK	77	SPEC	−	Σ^- Pb $\rightarrow \Sigma(1385)^-$ Pb, 23 GeV

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Sigma(1385) \rightarrow \Lambda\pi$ — $(\Gamma_6\Gamma_1)^{1/2}/\Gamma$

VALUE	DOCUMENT ID		CHG	COMMENT
+0.586$\pm$0.319	[14] DEVENISH	74B	0	Fixed-t dispersion rel.

$\Sigma(1385)$ FOOTNOTES

[1] From fit to inclusive $\Lambda\pi$ spectrum.
[2] Includes data of HOLMGREN 77.
[3] The errors are statistical only. The resolution is not unfolded.
[4] The error is enlarged to $\Gamma/\sqrt{N}$. See the note on the $K^*(892)$ mass in the 1984 edition.
[5] From a fit to $\Lambda\pi^0$ with the width fixed at 34 MeV.
[6] From fit to inclusive $\Lambda\pi^0$ spectrum with the width fixed at 40 MeV.
[7] Redundant with data in the mass Listings.

[8] Results from $\Lambda\pi^+\pi^-$ and $\Lambda\pi^+\pi^-\pi^0$ combined by us.
[9] The error is enlarged to $4\Gamma/\sqrt{N}$. See the note on the $K^*(892)$ mass in the 1984 edition.
[10] Consistent with $+$, 0, and $-$ widths equal.
[11] KELLER 12 gives $\Gamma(\Sigma^+\gamma)/\Gamma(\Sigma^+\pi^0) = (11.95 \pm 2.21^{+0.53}_{-1.21})\%$, using 1/2 our total $\Sigma(1385) \rightarrow \Sigma\pi$ fraction for $\Sigma^+\pi^0$. We divide the KELLER 12 value by two.
[12] We calculate this from the MOLCHANOV 04 upper limit of 9.5 keV on the $\Sigma^-\gamma$ width.
[13] We calculate this from the ARIK 77 upper limit of 24 keV on the $\Sigma^-\gamma$ width.
[14] An extrapolation of the parametrized amplitude below threshold.

Σ(1385) REFERENCES

AGAKISHIEV	12	PR C85 035203	G. Agakishiev *et al.*	(HADES Collab.)
KELLER	12	PR D85 052004	D. Keller *et al.*	(JLab CLAS Collab.)
KELLER	11	PR D83 072004	D. Keller *et al.*	(JLab CLAS Collab.)
TAYLOR	05	PR C71 054609	S. Taylor *et al.*	(JLab CLAS Collab.)
Also		PR C72 039902 (errat.)	S. Taylor *et al.*	(JLab CLAS Collab.)
MOLCHANOV	04	PL B590 161	V.V. Molchanov *et al.*	(FNAL SELEX Collab.)
BAUBILLIER	84	ZPHY C23 213	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)
PDG	84	RMP 56 S1	C.G. Wohl *et al.*	(LBL, CIT, CERN)
AGUILAR-...	81D	AFIS A77 144	M. Aguilar-Benitez, J. Salicio	(MADR)
BAKER	80	NP B166 207	P.A. Baker *et al.*	(LOIC)
BAUBILLIER	79B	NP B148 18	M. Baubillier *et al.*	(BIRM, CERN, GLAS+)
CAUTIS	79	NP B156 507	C.V. Cautis *et al.*	(SLAC)
SUGAHARA	79B	NP B156 237	R. Sugahara *et al.*	(KEK, OSKC, KINK)
CAMERON	78	NP B143 189	W. Cameron *et al.*	(RHEL, LOIC)
DIONISI	78B	PL 78B 154	C. Dionisi, R. Armenteros, J. Diaz	(CERN, AMST+)
ARIK	77	PRL 38 1000	E. Arik *et al.*	(PITT, BNL, MASA)
BARREIRO	77B	NP B126 319	F. Barreiro *et al.*	(CERN, AMST, NIJM)
HOLMGREN	77	NP B119 261	S.O. Holmgren *et al.*	(CERN, AMST, NIJM)
BARDADIN-...	75	NP B98 418	M. Bardadin-Otwinowska *et al.*	(SACL, EPOL+)
BERTHON	74	NC 21A 146	A. Berthon *et al.*	(CDEF, RHEL, SACL+)
BORENSTEIN	74	PR D9 3006	S.R. Borenstein *et al.*	(BNL, MICH)
DEVENISH	74B	NP B81 330	R.C.E. Devenish, C.D. Froggatt, B.R. Martin	(DESY+)
LICHTENBERG	74	PR D10 3865	D.B. Lichtenberg	(IND)
Also		Private Comm.	D.B. Lichtenberg	(IND)
HABIBI	73	Thesis Nevis 199	M. Habibi	(COLU)
Also		Purdue Conf. 387	C. Baltay *et al.*	(COLU, BING)
MAST	73	PR D7 3212	T.S. Mast *et al.*	(LBL) IJP
Also		PR D7 5	T.S. Mast *et al.*	(LBL) IJP
THOMAS	73	NP B56 15	D.W. Thomas *et al.*	(CMU) JP
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez *et al.*	(BNL)
COLLEY	71B	NP B31 61	D.C. Colley *et al.*	(BIRM, EDIN, GLAS+)
AGUILAR-...	70B	PRL 25 58	M. Aguilar-Benitez *et al.*	(BNL, SYRA)
PAN	69	PRL 23 808	Y.L. Pan, F.L. Forman	(PENN) I
SIEGEL	67	Thesis UCRL 18041	D.M. Siegel	(LRL)
BIRMINGHAM	66	PR 152 1148	M. Haque *et al.*	(BIRM, GLAS, LOIC, OXF+)
LONDON	66	PR 143 1034	G.W. London *et al.*	(BNL, SYRA) J
ARMENTEROS	65B	PL 19 75	R. Armenteros *et al.*	(CERN, HEID, SACL)
SMITH	65	Thesis UCLA	L.T. Smith	(UCLA)
COOPER	64	PL 8 365	W.A. Cooper *et al.*	(CERN, AMST)
HUWE	64	Thesis UCRL 11291	D.O. Huwe	(LRL) JP
Also		PR 181 1824	D.O. Huwe	(LRL)
CURTIS	63	PR 132 1771	L.J. Curtis *et al.*	(MICH) J
ALSTON	62	CERN Conf. 311	M.H. Alston *et al.*	(LRL)
BASTIEN	61	PRL 6 702	P.L. Bastien, M. Ferro-Luzzi, A.H. Rosenfeld	(LRL)
DAHL	61	PRL 6 142	O.I. Dahl *et al.*	(LRL)
ELY	61	PRL 7 461	R.P. Ely *et al.*	(LRL) J
ALSTON	60	PRL 5 520	M.H. Alston *et al.*	(LRL) I