

# $\Sigma(1385) P_{13}$

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

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** No. 2 Pt. II (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.

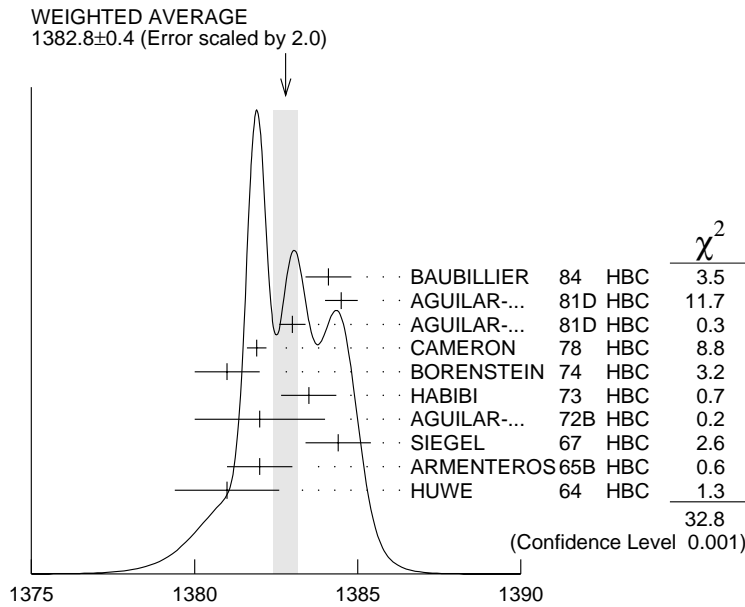
## $\Sigma(1385)$ MASSES

### $\Sigma(1385)^+$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1382.8±0.4</b>	<b>OUR AVERAGE</b>	Error includes scale factor of 2.0. See the ideogram below.		
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	ARMENTEROS65B	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. • • •

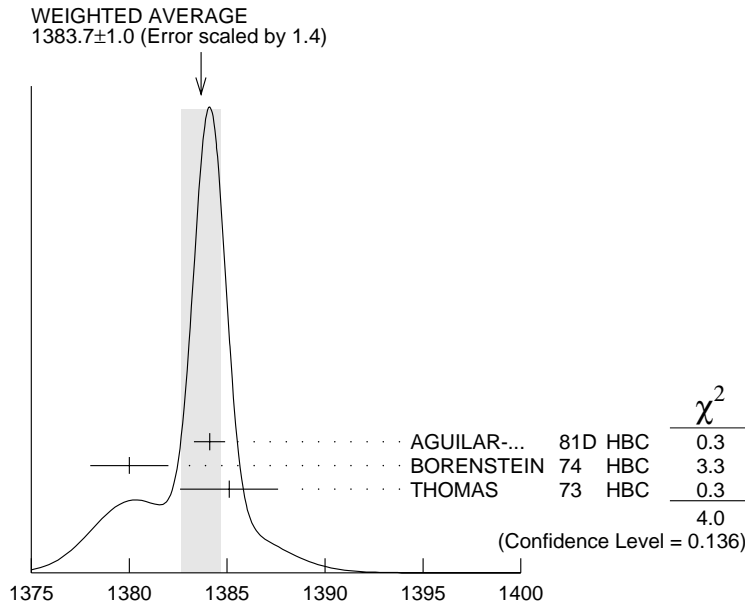
1385.1±1.2	600	BAKER	80	HYBR	$\pi^+ p$	7 GeV/c
1383.2±1.0	750	BAKER	80	HYBR	$K^- p$	7 GeV/c
1381 ±2	7k	<sup>1</sup> BAUBILLIER	79B	HBC	$K^- p$	8.25 GeV/c
1391 ±2	2k	CAUTIS	79	HYBR	$\pi^+ p/K^- p$	11.5 GeV
1390 ±2	100	<sup>1</sup> SUGAHARA	79B	HBC	$\pi^- p$	6 GeV/c
1385 ±3	22k	<sup>1,2</sup> BARREIRO	77B	HBC	$K^- p$	4.2 GeV/c
1385 ±1	2594	HOLMGREN	77	HBC	See AGUILAR 81D	
1380 ±2		<sup>1</sup> BARDADIN-...	75	HBC	$K^- p$	14.3 GeV/c
1382 ±1	3740	<sup>3</sup> 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	<sup>4</sup> 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	<sup>4</sup> SMITH	65	HBC	$K^- p$	1.8 GeV/c
1382.6±2.1	250	<sup>4</sup> 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	<sup>4</sup> ELY	61	HLBC	$K^- p$	1.11 GeV/c



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

## $\Sigma(1385)^0$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1383.7±1.0 OUR AVERAGE</b>		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	<sup>5</sup> BORENSTEIN 74	HBC	$K^- p \rightarrow \Lambda 3\pi$ 2.18 GeV/c
1385.1±2.5	240	<sup>4</sup> 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	<sup>6</sup> BAUBILLIER 79B	HBC	$K^- p$ 8.25 GeV/c



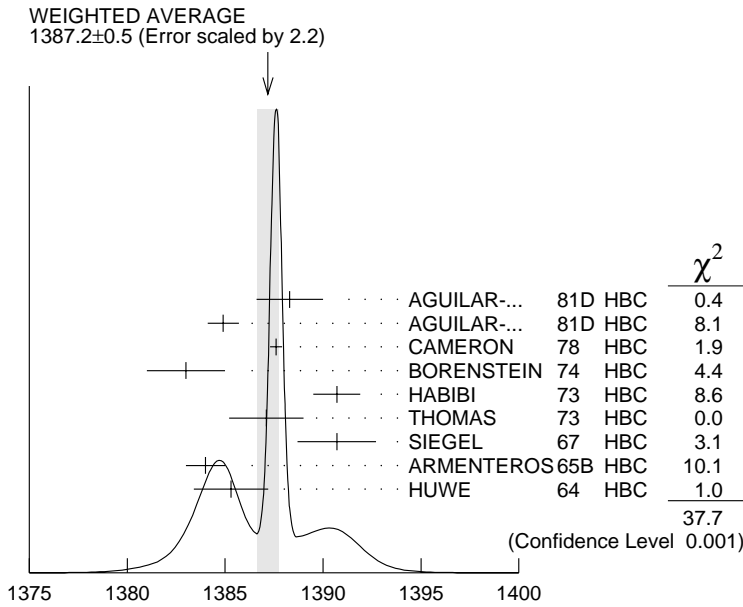
$\Sigma(1385)^0$  mass (MeV)

## $\Sigma(1385)^-$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>1387.2±0.5 OUR AVERAGE</b>		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	<sup>4</sup> 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	ARMENTEROS65B	HBC	$K^- p$ 0.9–1.2 GeV/c
1385.3±1.9	1086	<sup>4</sup> 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	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	<sup>7</sup> BORENSTEIN 74	HBC	$K^- p$ 2.18 GeV/c
7.2±1.4		<sup>7</sup> HABIBI 73	HBC	$K^- p \rightarrow \Lambda\pi\pi$
6.3±2.0		<sup>7</sup> SIEGEL 67	HBC	$K^- p$ 2.1 GeV/c
11 ±9		<sup>7</sup> LONDON 66	HBC	$K^- p$ 2.24 GeV/c
9 ±6		LONDON 66	HBC	$\Lambda 3\pi$ events
2.0±1.5		<sup>7</sup> ARMENTEROS65B	HBC	$K^- p$ 0.9–1.2 GeV/c
7.2±2.1		<sup>7</sup> SMITH 65	HBC	$K^- p$ 1.8 GeV/c
17.2±2.0		<sup>7</sup> SMITH 65	HBC	$K^- p$ 1.95 GeV/c
17 ±7		<sup>7</sup> COOPER 64	HBC	$K^- p$ 1.45 GeV/c
4.3±2.2		<sup>7</sup> HUWE 64	HBC	$K^- p$ 1.22 GeV/c
0.0±4.2		<sup>7</sup> 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	<sup>7</sup> 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	<sup>7</sup> THOMAS 73	HBC	$\pi^- p \rightarrow \Lambda\pi^- K^+$

## $\Sigma(1385)$ WIDTHS

### $\Sigma(1385)^+$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>35.8± 0.8 OUR AVERAGE</b>				
37.2± 2.0	1897	BAUBILLIER 84	HBC	$K^- p$ 8.25 GeV/c
35.1± 1.7	5256	AGUILAR-...	81D HBC	$K^- p \rightarrow \Lambda\pi\pi$ 4.2 GeV/c
37.5± 2.0	9361	AGUILAR-...	81D HBC	$K^- p \rightarrow \Lambda 3\pi$ 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	<sup>8</sup> BORENSTEIN 74	HBC	$K^- p$ 2.18 GeV/c
38.3± 3.2	2300	<sup>9</sup> HABIBI 73	HBC	$K^- p \rightarrow \Lambda\pi\pi$
32.5± 6.0	400	AGUILAR-...	72B HBC	$K^- p \rightarrow \Lambda\pi$ 's
36 ± 4	1260	<sup>9</sup> SIEGEL 67	HBC	$K^- p$ 2.1 GeV/c
32.0± 4.7	750	<sup>9</sup> ARMENTEROS65B	HBC	$K^- p$ 0.95–1.20 GeV/c
46.5± 6.4	859	<sup>9</sup> 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	<sup>1</sup> 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	<sup>1</sup> SUGAHARA	79B	HBC	$\pi^- p$ 6 GeV/c
43 ± 5	22k	<sup>1,2</sup> BARREIRO	77B	HBC	$K^- p$ 4.2 GeV/c
34 ± 2	2594	HOLMGREN	77	HBC	See AGUILAR 81D
40.0 ± 3.2		<sup>1</sup> BARDADIN-...	75	HBC	$K^- p$ 14.3 GeV/c
48 ± 3	3740	<sup>3</sup> BERTHON	74	HBC	$K^- p$ 1263–1843 MeV/c
33 ± 20	46	<sup>9</sup> AGUILAR-...	70B	HBC	$K^- p \rightarrow \Sigma \pi$ 's 4 GeV/c
25 ± 32	62	<sup>9</sup> BIRMINGHAM	66	HBC	$K^- p$ 3.5 GeV/c
30.3 ± 7.5	250	<sup>9</sup> SMITH	65	HBC	$K^- p$ 1.8 GeV/c
33.1 ± 8.3	250	<sup>9</sup> SMITH	65	HBC	$K^- p$ 1.95 GeV/c
51 ± 16	170	<sup>9</sup> COOPER	64	HBC	$K^- p$ 1.45 GeV/c
48 ± 16	154	<sup>9</sup> ELY	61	HLBC	$K^- p$ 1.11 GeV/c

### $\Sigma(1385)^0$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
<b>36 ± 5 OUR AVERAGE</b>				
34.8 ± 5.6	5722	AGUILAR-...	81D HBC	$K^- p \rightarrow \Lambda 3\pi$ 4.2 GeV/c
39.3 ± 10.2	240	<sup>9</sup> THOMAS	73 HBC	$\pi^- p \rightarrow \Lambda \pi^0 K^0$

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

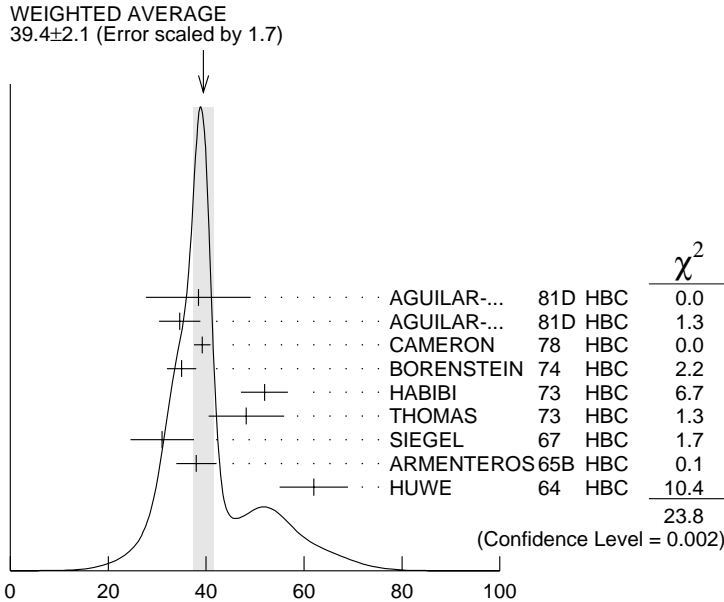
53 ± 8	3100	<sup>10</sup> BORENSTEIN	74	HBC	$K^- p \rightarrow \Lambda 3\pi$ 2.18 GeV/c
30 ± 9	106	CURTIS	63	OSPK	$\pi^- p$ 1.5 GeV/c

### $\Sigma(1385)^-$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT	
<b>39.4 ± 2.1 OUR AVERAGE</b>	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	<sup>8</sup> BORENSTEIN	74	HBC	$K^- p$ 2.18 GeV/c
51.9 ± 4.8	1900	<sup>9</sup> HABIBI	73	HBC	$K^- p \rightarrow \Lambda \pi \pi$
48.2 ± 7.7	630	<sup>9</sup> THOMAS	73	HBC	$\pi^- p \rightarrow \Lambda \pi^- K^0$
31.0 ± 6.5	370	<sup>9</sup> SIEGEL	67	HBC	$K^- p$ 2.1 GeV/c
38.0 ± 4.1	1382	<sup>9</sup> 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 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)

### $\Sigma(1385)$ POLE POSITIONS

#### $\Sigma(1385)^+$ REAL PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
1379±1	LICHTENBERG74	Extrapolates HABIBI 73

#### $\Sigma(1385)^+$ –IMAGINARY PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
17.5±1.5	LICHTENBERG74	Extrapolates HABIBI 73

#### $\Sigma(1385)^-$ REAL PART

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
1383±1	LICHTENBERG74	Extrapolates HABIBI 73

## $\Sigma(1385)^- - \text{IMAGINARY PART}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
22.5 ± 1.5	LICHTENBERG74	Extrapolates HABIBI 73

## $\Sigma(1385)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $\Lambda\pi$	88 ± 2 %
$\Gamma_2$ $\Sigma\pi$	12 ± 2 %
$\Gamma_3$ $\Lambda\gamma$	
$\Gamma_4$ $\Sigma\gamma$	
$\Gamma_5$ $N\bar{K}$	

The above branching fractions are our estimates, not fits or averages.

## $\Sigma(1385)$ BRANCHING RATIOS

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$					$\Gamma_2/\Gamma_1$
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<b>0.135 ± 0.011 OUR AVERAGE</b>					
0.20 ± 0.06	DIONISI	78B	HBC	±	$K^- p \rightarrow Y^* K \bar{K}$
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 ± 0.05	BORENSTEIN	74	HBC	+	$K^- p \rightarrow \Lambda\pi^+\pi^-, \Sigma^0\pi^+\pi^-$
0.18 ± 0.04	MAST	73	MPWA	±	$K^- p \rightarrow \Lambda\pi^+\pi^-, \Sigma^0\pi^+\pi^-$
0.10 ± 0.05	THOMAS	73	HBC	–	$\pi^- p \rightarrow \Lambda K\pi, \Sigma K\pi$
0.16 ± 0.07	AGUILAR-...	72B	HBC	+	$K^- p$ 3.9, 4.6 GeV/c
0.13 ± 0.04	COLLEY	71B	DBC	–0	$K^- N$ 1.5 GeV/c
0.13 ± 0.04	PAN	69	HBC	+	$\pi^+ p \rightarrow \Lambda K\pi, \Sigma K\pi$
0.08 ± 0.06	LONDON	66	HBC	+	$K^- p$ 2.24 GeV/c
0.163 ± 0.041	ARMENTEROS65B		HBC	±	$K^- p$ 0.95–1.20 GeV/c
0.09 ± 0.04	HUWE	64	HBC	±	$K^- p$ 1.2–1.7 GeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<0.04	ALSTON	62	HBC	±0	$K^- p$ 1.15 GeV/c
0.04 ± 0.04	BASTIEN	61	HBC	±	

$\Gamma(\Lambda\gamma)/\Gamma_{\text{total}}$					$\Gamma_3/\Gamma$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
0.17 ± 0.17	1	MEISNER	72	HBC	1 event only



$\Gamma(\Lambda\gamma)/\Gamma(\Lambda\pi)$   $\Gamma_3/\Gamma_1$

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

<0.06	90	COLAS	75 HLBC	$K^- p$ 575–970 MeV
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$\Gamma(\Sigma\gamma)/\Gamma(\Lambda\pi)$   $\Gamma_4/\Gamma_1$

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

<0.05	90	COLAS	75 HLBC	$K^- p$ 575–970 MeV
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$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$  in  $N\bar{K} \rightarrow \Sigma(1385) \rightarrow \Lambda\pi$   $(\Gamma_5\Gamma_1)^{1/2}/\Gamma$

VALUE	DOCUMENT ID	CHG	COMMENT
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+0.586±0.319	<sup>11</sup> DEVENISH	74B 0	Fixed- <i>t</i> dispersion rel.
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### $\Sigma(1385)$ FOOTNOTES

- <sup>1</sup> From fit to inclusive  $\Lambda\pi$  spectrum.
- <sup>2</sup> Includes data of HOLMGREN 77.
- <sup>3</sup> The errors are statistical only. The resolution is not unfolded.
- <sup>4</sup> The error is enlarged to  $\Gamma/\sqrt{N}$ . See the note on the  $K^*(892)$  mass in the 1984 edition.
- <sup>5</sup> From a fit to  $\Lambda\pi^0$  with the width fixed at 34 MeV.
- <sup>6</sup> From fit to inclusive  $\Lambda\pi^0$  spectrum with the width fixed at 40 MeV.
- <sup>7</sup> Redundant with data in the mass Listings.
- <sup>8</sup> Results from  $\Lambda\pi^+\pi^-$  and  $\Lambda\pi^+\pi^-\pi^0$  combined by us.
- <sup>9</sup> The error is enlarged to  $4\Gamma/\sqrt{N}$ . See the note on the  $K^*(892)$  mass in the 1984 edition.
- <sup>10</sup> Consistent with +, 0, and – widths equal.
- <sup>11</sup> An extrapolation of the parametrized amplitude below threshold.

### $\Sigma(1385)$ REFERENCES

BAUBILLIER	84	ZPHY C23 213	+	(BIRM, CERN, GLAS, MSU, CURIN)
PDG	84	RMP 56 No. 2 Pt. II	Wohl, Cahn, Rittenberg+	(LBL, CIT, CERN)
AGUILAR-...	81D	AFIS A77 144	Aguilar-Benitez, Salicio	(MADR)
BAKER	80	NP B166 207	+Chima, Dornan, Gibbs, Hall, Miller+	(LOIC)
BAUBILLIER	79B	NP B148 18	+	(BIRM, CERN, GLAS, MSU, CURIN)
CAUTIS	79	NP B156 507	+Ballam, Bouchez, Carroll, Chadwick+	(SLAC)
SUGAHARA	79B	NP B156 237	+Ochiai, Fukui, Cooper+	(KEK, OSKC, KINK)
CAMERON	78	NP B143 189	+Franek, Gopal, Bacon, Butterworth+	(RHEL, LOIC)
DIONISI	78B	PL 78B 154	+Armenteros, Diaz	(CERN, AMST, NIJM, OXF)
BARREIRO	77B	NP B126 319	+Berge, Ganguli, Blokzijl+	(CERN, AMST, NIJM)
HOLMGREN	77	NP B119 261	+Aguilar-Benitez, Kluyver+	(CERN, AMST, NIJM)
BARDADIN-...	75	NP B98 418	Bardadin-Otwinowska+	(SACL, EPOL, RHEL)
COLAS	75	NP B91 253	+Farwell, Ferrer, Six	(ORSAY)
BERTHON	74	NC 21A 146	+Tristram+	(CDEF, RHEL, SACL, STRB)
BORENSTEIN	74	PR D9 3006	+Kalbfleisch, Strand+	(BNL, MICH)
DEVENISH	74B	NP B81 330	+Froggatt, Martin	(DESY, NORD, LOUC)
LICHTENBERG	74	PR D10 3865		(IND)
Also	74B	Private Comm.	Lichtenberg	(IND)
HABIBI	73	Thesis Nevis 199		(COLU)
Also	73	Purdue Conf. 387	Baltay, Bridgewater, Cooper+	(COLU, BING)
MAST	73	PR D7 3212	+Bangerter, Alston-Garnjost+	(LBL) IJP
Also	73B	PR D7 5	Mast, Bangerter, Alston-Garnjost+	(LBL) IJP

THOMAS	73	NP B56 15	+Engler, Fisk, Kraemer	(CMU) JP
AGUILAR-...	72B	PR D6 29	Aguilar-Benitez, Chung, Eisner, Samios	(BNL)
MEISNER	72	NC 12A 62		(UNC, LBL)
COLLEY	71B	NP B31 61	+Cox, Eastwood, Fry+	(BIRM, EDIN, GLAS, LOIC)
AGUILAR-...	70B	PRL 25 58	Aguilar-Benitez, Barnes, Bassano+	(BNL, SYRA)
PAN	69	PRL 23 808	+Forman	(PENN) I
SIEGEL	67	Thesis UCRL 18041		(LRL)
BIRMINGHAM	66	PR 152 1148		(BIRM, GLAS, LOIC, OXF, RHEL)
LONDON	66	PR 143 1034	+Rau, Goldberg, Lichtman+	(BNL, SYRA) J
ARMENTEROS	65B	PL 19 75	+	(CERN, HEID, SACL)
SMITH	65	Thesis UCLA		(UCLA)
COOPER	64	PL 8 365	+Filthuth, Fridman, Malamud+	(CERN, AMST)
HUWE	64	Thesis UCRL 11291		(LRL) JP
Also	69	PR 180 1824	Huwe	(LRL)
CURTIS	63	PR 132 1771	+Coffin, Meyer, Terwilliger	(MICH) J
ALSTON	62	CERN Conf. 311	+Alvarez, Ferro-Luzzi+	(LRL)
BASTIEN	61	PRL 6 702	+Ferro-Luzzi, Rosenfeld	(LRL)
DAHL	61	PRL 6 142	+Horwitz, Miller, Murray, White	(LRL)
ELY	61	PRL 7 461	+Fung, Gidal, Pan, Powell, White	(LRL) J
ALSTON	60	PRL 5 520	+Alvarez, Eberhard, Good, Graziano+	(LRL) I

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