



$$I(J^P) = 0(\frac{1}{2}^+) \text{ Status: } ****$$

$J$  has not actually been measured yet. Results of an analysis of  $pK^- \pi^+$  decays (JEZABEK 92) are consistent with the expected  $J = 1/2$ . The quark content is  $udc$ .

We have omitted some results that have been superseded by later experiments. The omitted results may be found in earlier editions.

### $\Lambda_c^+$ MASS

Measurements with an error greater than 5 MeV or that are otherwise obsolete have been omitted.

The fit also includes  $\Sigma_c - \Lambda_c^+$  and  $\Lambda_c^{*+} - \Lambda_c^+$  mass-difference measurements.

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>2284.9 ± 0.6 OUR FIT</b>				
<b>2284.9 ± 0.6 OUR AVERAGE</b>				
2284.7 ± 0.6 ± 0.7	1134	AVERY	91 CLEO	Six modes
2281.7 ± 2.7 ± 2.6	29	ALVAREZ	90B NA14	$pK^- \pi^+$
2285.8 ± 0.6 ± 1.2	101	BARLAG	89 NA32	$pK^- \pi^+$
2284.7 ± 2.3 ± 0.5	5	AGUILAR-...	88B LEBC	$pK^- \pi^+$
2283.1 ± 1.7 ± 2.0	628	ALBRECHT	88C ARG	$pK^- \pi^+$ , $p\bar{K}^0$ , $\Lambda 3\pi$
2286.2 ± 1.7 ± 0.7	97	ANJOS	88B E691	$pK^- \pi^+$
2281 ± 3	2	JONES	87 HBC	$pK^- \pi^+$
2283 ± 3	3	BOSETTI	82 HBC	$pK^- \pi^+$
2290 ± 3	1	CALICCHIO	80 HYBR	$pK^- \pi^+$

### $\Lambda_c^+$ MEAN LIFE

Measurements with an error  $\geq 0.1 \times 10^{-12}$  s or with fewer than 20 events have been omitted.

<u>VALUE (<math>10^{-12}</math> s)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.206 ± 0.012 OUR AVERAGE</b>				
0.215 ± 0.016 ± 0.008	1340	FRABETTI	93D E687	$\gamma \text{Be}, \Lambda_c^+ \rightarrow pK^- \pi^+$
0.18 ± 0.03 ± 0.03	29	ALVAREZ	90 NA14	$\gamma, \Lambda_c^+ \rightarrow pK^- \pi^+$
0.20 ± 0.03 ± 0.03	90	FRABETTI	90 E687	$\gamma \text{Be}, \Lambda_c^+ \rightarrow pK^- \pi^+$
0.196 <sup>+0.023</sup> <sub>-0.020</sub>	101	BARLAG	89 NA32	$pK^- \pi^+ + \text{c.c.}$
0.22 ± 0.03 ± 0.02	97	ANJOS	88B E691	$pK^- \pi^+ + \text{c.c.}$

$\Lambda_c^+$  DECAY MODES

Nearly all branching fractions of the  $\Lambda_c^+$  are measured relative to the  $pK^-\pi^+$  mode, but there are no model-independent measurements of this branching fraction. We explain how we arrive at our value of  $B(\Lambda_c^+ \rightarrow pK^-\pi^+)$  in a Note at the beginning of the branching-ratio measurements, below. When this branching fraction is eventually well determined, all the other branching fractions will slide up or down proportionally as the true value differs from the value we use here.

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Scale factor/ Confidence level
<b>Hadronic modes with a <math>p</math> and one <math>\bar{K}</math></b>		
$\Gamma_1$	$p\bar{K}^0$	( 2.5 $\pm$ 0.7 ) %
$\Gamma_2$	$pK^-\pi^+$	[a] ( 5.0 $\pm$ 1.3 ) %
$\Gamma_3$	$p\bar{K}^*(892)^0$	[b] ( 1.8 $\pm$ 0.6 ) %
$\Gamma_4$	$\Delta(1232)^{++}K^-$	( 8 $\pm$ 5 ) $\times 10^{-3}$
$\Gamma_5$	$\Lambda(1520)\pi^+$	[b] ( 4.5 $^{+2.5}_{-2.1}$ ) $\times 10^{-3}$
$\Gamma_6$	$pK^-\pi^+$ nonresonant	( 2.8 $\pm$ 0.9 ) %
$\Gamma_7$	$p\bar{K}^0\eta$	( 1.3 $\pm$ 0.4 ) %
$\Gamma_8$	$p\bar{K}^0\pi^+\pi^-$	( 2.4 $\pm$ 1.1 ) %
$\Gamma_9$	$pK^-\pi^+\pi^0$	seen
$\Gamma_{10}$	$pK^*(892)^-\pi^+$	[b] ( 1.1 $\pm$ 0.6 ) %
$\Gamma_{11}$	$p(K^-\pi^+)_{\text{nonresonant}}\pi^0$	( 3.6 $\pm$ 1.2 ) %
$\Gamma_{12}$	$\Delta(1232)\bar{K}^*(892)$	seen
$\Gamma_{13}$	$pK^-\pi^+\pi^+\pi^-$	( 1.1 $\pm$ 0.8 ) $\times 10^{-3}$
$\Gamma_{14}$	$pK^-\pi^+\pi^0\pi^0$	( 8 $\pm$ 4 ) $\times 10^{-3}$
$\Gamma_{15}$	$pK^-\pi^+\pi^0\pi^0\pi^0$	( 5.0 $\pm$ 3.4 ) $\times 10^{-3}$
<b>Hadronic modes with a <math>p</math> and zero or two <math>K</math>'s</b>		
$\Gamma_{16}$	$p\pi^+\pi^-$	( 3.5 $\pm$ 2.0 ) $\times 10^{-3}$
$\Gamma_{17}$	$pf_0(980)$	[b] ( 2.8 $\pm$ 1.9 ) $\times 10^{-3}$
$\Gamma_{18}$	$p\pi^+\pi^+\pi^-\pi^-$	( 1.8 $\pm$ 1.2 ) $\times 10^{-3}$
$\Gamma_{19}$	$pK^+K^-$	( 2.3 $\pm$ 0.9 ) $\times 10^{-3}$
$\Gamma_{20}$	$p\phi$	[b] ( 1.2 $\pm$ 0.5 ) $\times 10^{-3}$
<b>Hadronic modes with a hyperon</b>		
$\Gamma_{21}$	$\Lambda\pi^+$	( 9.0 $\pm$ 2.8 ) $\times 10^{-3}$
$\Gamma_{22}$	$\Lambda\pi^+\pi^0$	( 3.6 $\pm$ 1.3 ) %
$\Gamma_{23}$	$\Lambda\rho^+$	< 5 %
$\Gamma_{24}$	$\Lambda\pi^+\pi^+\pi^-$	( 3.3 $\pm$ 1.0 ) %
$\Gamma_{25}$	$\Lambda\pi^+\eta$	( 1.7 $\pm$ 0.6 ) %
$\Gamma_{26}$	$\Sigma(1385)^+\eta$	[b] ( 8.5 $\pm$ 3.3 ) $\times 10^{-3}$
$\Gamma_{27}$	$\Lambda K^+\bar{K}^0$	( 6.0 $\pm$ 2.1 ) $\times 10^{-3}$
$\Gamma_{28}$	$\Sigma^0\pi^+$	( 9.9 $\pm$ 3.2 ) $\times 10^{-3}$

$\Gamma_{29}$	$\Sigma^+ \pi^0$		$(1.00 \pm 0.34) \%$	
$\Gamma_{30}$	$\Sigma^+ \eta$		$(5.5 \pm 2.3) \times 10^{-3}$	
$\Gamma_{31}$	$\Sigma^+ \pi^+ \pi^-$		$(3.4 \pm 1.0) \%$	
$\Gamma_{32}$	$\Sigma^+ \rho^0$		$< 1.4$	$\%$ CL=95%
$\Gamma_{33}$	$\Sigma^- \pi^+ \pi^+$		$(1.8 \pm 0.8) \%$	
$\Gamma_{34}$	$\Sigma^0 \pi^+ \pi^0$		$(1.8 \pm 0.8) \%$	
$\Gamma_{35}$	$\Sigma^0 \pi^+ \pi^+ \pi^-$		$(1.1 \pm 0.4) \%$	
$\Gamma_{36}$	$\Sigma^+ \pi^+ \pi^- \pi^0$		—	
$\Gamma_{37}$	$\Sigma^+ \omega$	[b]	$(2.7 \pm 1.0) \%$	
$\Gamma_{38}$	$\Sigma^+ \pi^+ \pi^+ \pi^- \pi^-$		$(3.0 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 4.1 \\ 2.1 \end{smallmatrix}) \times 10^{-3}$	
$\Gamma_{39}$	$\Sigma^+ K^+ K^-$		$(3.5 \pm 1.2) \times 10^{-3}$	
$\Gamma_{40}$	$\Sigma^+ \phi$	[b]	$(3.5 \pm 1.7) \times 10^{-3}$	
$\Gamma_{41}$	$\Sigma^+ K^+ \pi^-$		$(7 \begin{smallmatrix} + \\ - \end{smallmatrix} \begin{smallmatrix} 6 \\ 4 \end{smallmatrix}) \times 10^{-3}$	
$\Gamma_{42}$	$\Xi^0 K^+$		$(3.9 \pm 1.4) \times 10^{-3}$	
$\Gamma_{43}$	$\Xi^- K^+ \pi^+$		$(4.9 \pm 1.7) \times 10^{-3}$	
$\Gamma_{44}$	$\Xi(1530)^0 K^+$	[b]	$(2.6 \pm 1.0) \times 10^{-3}$	

### Semileptonic modes

$\Gamma_{45}$	$\Lambda \ell^+ \nu_\ell$	[c]	$(2.0 \pm 0.6) \%$	
$\Gamma_{46}$	$\Lambda e^+ \nu_e$		$(2.1 \pm 0.6) \%$	
$\Gamma_{47}$	$\Lambda \mu^+ \nu_\mu$		$(2.0 \pm 0.7) \%$	
$\Gamma_{48}$	$e^+$ anything		$(4.5 \pm 1.7) \%$	
$\Gamma_{49}$	$p e^+$ anything		$(1.8 \pm 0.9) \%$	
$\Gamma_{50}$	$\Lambda e^+$ anything		—	
$\Gamma_{51}$	$\Lambda \mu^+$ anything		—	
$\Gamma_{52}$	$\Lambda \ell^+ \nu_\ell$ anything		—	

### Inclusive modes

$\Gamma_{53}$	$p$ anything		$(50 \pm 16) \%$	
$\Gamma_{54}$	$p$ anything (no $\Lambda$ )		$(12 \pm 19) \%$	
$\Gamma_{55}$	$p$ hadrons		—	
$\Gamma_{56}$	$n$ anything		$(50 \pm 16) \%$	
$\Gamma_{57}$	$n$ anything (no $\Lambda$ )		$(29 \pm 17) \%$	
$\Gamma_{58}$	$\Lambda$ anything		$(35 \pm 11) \%$	S=1.4
$\Gamma_{59}$	$\Sigma^\pm$ anything	[d]	$(10 \pm 5) \%$	

### $\Delta C = 1$ weak neutral current (C1) modes, or Lepton number (L) violating modes

$\Gamma_{60}$	$p \mu^+ \mu^-$	C1	$< 3.4$	$\times 10^{-4}$	CL=90%
$\Gamma_{61}$	$\Sigma^- \mu^+ \mu^+$	L	$< 7.0$	$\times 10^{-4}$	CL=90%

[a] See the “Note on  $\Lambda_c^+$  Branching Fractions” below.

[b] This branching fraction includes all the decay modes of the final-state resonance.

[c] An  $\ell$  indicates an  $e$  or a  $\mu$  mode, not a sum over these modes.

[d] The value is for the sum of the charge states of particle/antiparticle states indicated.

## NOTE ON $\Lambda_c^+$ BRANCHING FRACTIONS

Written 1998 by P.R. Burchat (Stanford University).

Most  $\Lambda_c^+$  branching fractions are measured relative to the decay mode  $\Lambda_c^+ \rightarrow pK^-\pi^+$ . However, there are no model-independent measurements of the absolute branching fraction for  $\Lambda_c^+ \rightarrow pK^-\pi^+$ . Here, we describe the measurements that have been used to extract  $B(\Lambda_c^+ \rightarrow pK^-\pi^+)$ , the model-dependence of the results, and the method we have used to average the results.

ARGUS (ALBRECHT 88C) and CLEO (CRAWFORD 92) measure  $B(\bar{B} \rightarrow \Lambda_c^+ X) \times B(\Lambda_c^+ \rightarrow pK^-\pi^+)$  to be  $(0.30 \pm 0.12 \pm 0.06)\%$  and  $(0.273 \pm 0.051 \pm 0.039)\%$ . Under the assumptions that decays of  $\bar{B}$  mesons to baryons are dominated by  $\bar{B} \rightarrow \Lambda_c^+ X$  and that  $\Lambda_c^+ X$  final states other than  $\Lambda_c^+ \bar{N} X$  can be neglected, they also measure  $B(\bar{B} \rightarrow \Lambda_c^+ X)$  to be  $(6.8 \pm 0.5 \pm 0.3)\%$  (ALBRECHT 92O) and  $(6.4 \pm 0.8 \pm 0.8)\%$  (CRAWFORD 92). Combining these results, we get  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (4.14 \pm 0.91)\%$ . However, the assumption that  $\bar{B}$  decay modes to baryons other than  $\Lambda_c^+ \bar{N} X$  are negligible is not on solid ground experimentally or theoretically. Therefore, the branching fraction for  $\Lambda_c^+ \rightarrow pK^-\pi^+$  given above may be low by some undetermined amount.

The second type of model-dependent determination of  $B(\Lambda_c^+ \rightarrow pK^-\pi^+)$  is based on measurements by ARGUS (ALBRECHT 91G) and CLEO (BERGFELD 94) of  $\sigma(e^+e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow \Lambda \ell^+ \nu_\ell) = (4.15 \pm 1.03 \pm 1.18)$  pb and  $(4.77 \pm 0.25 \pm 0.66)$  pb. ARGUS (ALBRECHT 96E) and CLEO

(AVERY 91) have also measured  $\sigma(e^+e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow pK^-\pi^+)$ . The weighted average is  $(11.2 \pm 1.3)$  pb.

From these measurements, we extract  $R \equiv B(\Lambda_c^+ \rightarrow pK^-\pi^+)/B(\Lambda_c^+ \rightarrow \Lambda\ell^+\nu_\ell) = 2.40 \pm 0.43$ . We estimate the  $\Lambda_c^+ \rightarrow pK^-\pi^+$  branching fraction from the equation

$$B(\Lambda_c^+ \rightarrow pK^-\pi^+) = R f F \frac{\Gamma(D \rightarrow X\ell^+\nu_\ell)}{1 + |V_{cd}/V_{cs}|^2} \cdot \tau(\Lambda_c^+) , \quad (1)$$

where  $f = B(\Lambda_c^+ \rightarrow \Lambda\ell^+\nu_\ell)/B(\Lambda_c^+ \rightarrow X_s\ell^+\nu_\ell)$  and  $F = \Gamma(\Lambda_c^+ \rightarrow X_s\ell^+\nu_\ell)/\Gamma(D^0 \rightarrow X_s\ell^+\nu_\ell)$ . When we use  $1 + |V_{cd}/V_{cs}|^2 = 1.05$  and the world averages  $\Gamma(D \rightarrow X\ell^+\nu_\ell) = (0.163 \pm 0.006) \times 10^{-12} \text{ s}^{-1}$  and  $\tau(\Lambda_c^+) = (0.206 \pm 0.012) \times 10^{-12} \text{ s}$ , we calculate  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (7.7 \pm 1.5)\% \cdot f F$ . Theoretical estimates for  $f$  and  $F$  are near 1.0 with significant uncertainties.

So, we have two results with significant model-dependence:  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (4.14 \pm 0.91)\%$  from  $\overline{B}$  decays, and  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (7.7 \pm 1.5)\% \cdot f F$  from semileptonic  $\Lambda_c^+$  decays. If we set  $f F = 1.0$  in the second result, and assign an uncertainty of 30% to each result to account for the unknown model-dependence, we get the consistent results  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (4.14 \pm 0.91 \pm 1.24)\%$  and  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (7.7 \pm 1.5 \pm 2.3)\%$ . The weighted average of these two results is  $B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (5.0 \pm 1.3)\%$ , where the uncertainty contains both the experimental uncertainty and the 30% estimate of model dependence in each result.

This procedure is clearly rather arbitrary, but so is any other procedure until good measurements of the absolute branching fraction are made. Therefore, we have assigned the value  $(5.0 \pm 1.3)\%$  to the  $\Lambda_c^+ \rightarrow pK^-\pi^+$  branching fraction (given as PDG 98 below). As was noted earlier, most of the other modes are measured relative to this mode.

$\Lambda_c^+$  BRANCHING RATIOS————— Hadronic modes with a  $p$  and one  $\bar{K}$  ————— $\Gamma(p\bar{K}^0)/\Gamma(pK^-\pi^+)$   $\Gamma_1/\Gamma_2$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.49±0.07 OUR AVERAGE</b>				
0.44±0.07±0.05	133	AVERY	91 CLEO	$e^+e^-$ 10.5 GeV
0.55±0.17±0.14	45	ANJOS	90 E691	$\gamma$ Be 70–260 GeV
0.62±0.15±0.03	73	ALBRECHT	88C ARG	$e^+e^-$ 10 GeV

 $\Gamma(pK^-\pi^+)/\Gamma_{\text{total}}$   $\Gamma_2/\Gamma$ See the "Note on  $\Lambda_c^+$  Branching Fractions" above.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.050±0.013</b>	PDG	98	See note at top of ratios
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.041±0.010	<sup>1,2</sup> ALBRECHT	920 ARG	$e^+e^- \approx \Upsilon(4S)$
0.044±0.012	<sup>1,3</sup> CRAWFORD	92 CLEO	$e^+e^-$ 10.5 GeV

<sup>1</sup> To extract  $\Gamma(pK^-\pi^+)/\Gamma_{\text{total}}$ , we use  $B(\bar{B} \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow pK^-\pi^+) = (0.28 \pm 0.06)\%$ , which is the average of measurements from ARGUS (ALBRECHT 88C) and CLEO (CRAWFORD 92).

<sup>2</sup> ALBRECHT 920 measures  $B(\bar{B} \rightarrow \Lambda_c^+ X) = (6.8 \pm 0.5 \pm 0.3)\%$ .

<sup>3</sup> CRAWFORD 92 measures  $B(\bar{B} \rightarrow \Lambda_c^+ X) = (6.4 \pm 0.8 \pm 0.8)\%$ .

 $\Gamma(p\bar{K}^*(892)^0)/\Gamma(pK^-\pi^+)$   $\Gamma_3/\Gamma_2$ Unseen decay modes of the  $\bar{K}^*(892)^0$  are included.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.36<sup>+0.06</sup><sub>-0.07</sub> OUR AVERAGE</b>				
0.35 <sup>+0.06</sup> <sub>-0.07</sub> ±0.03	39	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV
0.42±0.24	12	BASILE	81B CNTR	$pp \rightarrow \Lambda_c^+ e^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.35±0.11		BARLAG	90D NA32	See BOZEK 93

 $\Gamma(\Delta(1232)^{++}K^-)/\Gamma(pK^-\pi^+)$   $\Gamma_4/\Gamma_2$ 

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.16±0.10 OUR AVERAGE</b> Error includes scale factor of 1.5.				
0.12 <sup>+0.04</sup> <sub>-0.05</sub> ±0.05	14	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV
0.40±0.17	17	BASILE	81B CNTR	$pp \rightarrow \Lambda_c^+ e^- X$

 $\Gamma(\Lambda(1520)\pi^+)/\Gamma(pK^-\pi^+)$   $\Gamma_5/\Gamma_2$ Unseen decay modes of the  $\Lambda(1520)$  are included.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.09<sup>+0.04</sup><sub>-0.03</sub>±0.02</b>				
	12	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV

$$\Gamma(pK^- \pi^+ \text{nonresonant})/\Gamma(pK^- \pi^+) \quad \Gamma_6/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.56^{+0.07}_{-0.09} \pm 0.05$	71	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV

$$\Gamma(p\bar{K}^0 \eta)/\Gamma(pK^- \pi^+) \quad \Gamma_7/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.25 \pm 0.04 \pm 0.04$	57	AMMAR	95 CLE2	$e^+ e^- \approx \Upsilon(4S)$

$$\Gamma(p\bar{K}^0 \pi^+ \pi^-)/\Gamma(pK^- \pi^+) \quad \Gamma_8/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.49 \pm 0.17</math> OUR AVERAGE</b>	Error	includes scale factor of 1.4.		
$0.43 \pm 0.12 \pm 0.04$	83	AVERY	91 CLEO	$e^+ e^-$ 10.5 GeV
$0.98 \pm 0.36 \pm 0.08$	12	BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(pK^- \pi^+ \pi^0)/\Gamma_{\text{total}} \quad \Gamma_9/\Gamma$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>seen</b>	44	AMENDOLIA	87 SPEC	$\gamma$ Ge-Si

$$\Gamma(pK^*(892)^- \pi^+)/\Gamma(p\bar{K}^0 \pi^+ \pi^-) \quad \Gamma_{10}/\Gamma_8$$

Unseen decay modes of the  $K^*(892)^-$  are included.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.44 \pm 0.14</math></b>	17	ALEEV	94 BIS2	$nN$ 20-70 GeV

$$\Gamma(p(K^- \pi^+)_{\text{nonresonant}} \pi^0)/\Gamma(pK^- \pi^+) \quad \Gamma_{11}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.73 \pm 0.12 \pm 0.05</math></b>	67	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV

$$\Gamma(\Delta(1232)\bar{K}^*(892))/\Gamma_{\text{total}} \quad \Gamma_{12}/\Gamma$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>seen</b>	35	AMENDOLIA	87 SPEC	$\gamma$ Ge-Si

$$\Gamma(pK^- \pi^+ \pi^+ \pi^-)/\Gamma(pK^- \pi^+) \quad \Gamma_{13}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.022 \pm 0.015</math></b>		BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(pK^- \pi^+ \pi^0 \pi^0)/\Gamma(pK^- \pi^+) \quad \Gamma_{14}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.16 \pm 0.07 \pm 0.03</math></b>	15	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV

$$\Gamma(pK^- \pi^+ \pi^0 \pi^0 \pi^0)/\Gamma(pK^- \pi^+) \quad \Gamma_{15}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.10 \pm 0.06 \pm 0.02</math></b>	8	BOZEK	93 NA32	$\pi^-$ Cu 230 GeV

————— Hadronic modes with a  $p$  and 0 or 2  $K$ 's —————

$$\Gamma(p\pi^+ \pi^-)/\Gamma(pK^- \pi^+) \quad \Gamma_{16}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>0.069 \pm 0.036</math></b>		BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(\rho f_0(980))/\Gamma(\rho K^- \pi^+) \quad \Gamma_{17}/\Gamma_2$$

Unseen decay modes of the  $f_0(980)$  are included.

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.055±0.036</b>	BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(\rho \pi^+ \pi^+ \pi^- \pi^-)/\Gamma(\rho K^- \pi^+) \quad \Gamma_{18}/\Gamma_2$$

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.036±0.023</b>	BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(\rho K^+ K^-)/\Gamma(\rho K^- \pi^+) \quad \Gamma_{19}/\Gamma_2$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.046±0.012 OUR AVERAGE</b>				Error includes scale factor of 1.2.
0.039±0.009±0.007	214	ALEXANDER	96C CLE2	$e^+ e^- \approx \gamma(4S)$
0.096±0.029±0.010	30	FRABETTI	93H E687	$\gamma \text{Be}, \bar{E}_\gamma$ 220 GeV
0.048±0.027		BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(\rho \phi)/\Gamma(\rho K^- \pi^+) \quad \Gamma_{20}/\Gamma_2$$

Unseen decay modes of the  $\phi$  are included.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.024±0.006±0.003</b>	54	ALEXANDER	96C CLE2	$e^+ e^- \approx \gamma(4S)$
•••				We do not use the following data for averages, fits, limits, etc. •••
0.040±0.027		BARLAG	90D NA32	$\pi^-$ 230 GeV

$$\Gamma(\rho \phi)/\Gamma(\rho K^+ K^-) \quad \Gamma_{20}/\Gamma_{19}$$

Unseen decay modes of the  $\phi$  are included.

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
•••				We do not use the following data for averages, fits, limits, etc. •••
<0.58	90	FRABETTI	93H E687	$\gamma \text{Be}, \bar{E}_\gamma$ 220 GeV

————— Hadronic modes with a hyperon —————

$$\Gamma(\Lambda \pi^+)/\Gamma(\rho K^- \pi^+) \quad \Gamma_{21}/\Gamma_2$$

VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.180±0.032 OUR AVERAGE</b>					
0.18 ±0.03 ±0.04			ALBRECHT	92 ARG	$e^+ e^- \approx 10.4$ GeV
0.18 ±0.03 ±0.03		87	AVERY	91 CLEO	$e^+ e^-$ 10.5 GeV
•••					We do not use the following data for averages, fits, limits, etc. •••
<0.33	90		ANJOS	90 E691	$\gamma \text{Be}$ 70–260 GeV
<0.16	90		ALBRECHT	88C ARG	$e^+ e^-$ 10 GeV

$$\Gamma(\Lambda \pi^+ \pi^0)/\Gamma(\rho K^- \pi^+) \quad \Gamma_{22}/\Gamma_2$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.73±0.09±0.16</b>	464	AVERY	94 CLE2	$e^+ e^- \approx \gamma(3S), \gamma(4S)$

$$\Gamma(\Lambda \rho^+)/\Gamma(\rho K^- \pi^+) \quad \Gamma_{23}/\Gamma_2$$

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<b>&lt;0.95</b>	95	AVERY	94 CLE2	$e^+ e^- \approx \gamma(3S), \gamma(4S)$



$$\Gamma(\Lambda\pi^+\pi^+\pi^-)/\Gamma_{\text{total}} \qquad \Gamma_{24}/\Gamma$$

<u>VALUE</u>	<u>EVTS</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. • • •

$0.028 \pm 0.007 \pm 0.011$	70	<sup>4</sup> BOWCOCK	85	CLEO $e^+e^-$ 10.5 GeV
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<sup>4</sup> See BOWCOCK 85 for assumptions made on charm production and  $\Lambda_c$  production from charm to get this result.

$$\Gamma(\Lambda\pi^+\pi^+\pi^-)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{24}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.66 ± 0.11 OUR AVERAGE**

$0.65 \pm 0.11 \pm 0.12$	289	AVERY	91	CLEO $e^+e^-$ 10.5 GeV
$0.82 \pm 0.29 \pm 0.27$	44	ANJOS	90	E691 $\gamma$ Be 70–260 GeV
$0.94 \pm 0.41 \pm 0.13$	10	BARLAG	90D	NA32 $\pi^-$ 230 GeV
$0.61 \pm 0.16 \pm 0.04$	105	ALBRECHT	88C	ARG $e^+e^-$ 10 GeV

$$\Gamma(\rho\bar{K}^0\pi^+\pi^-)/\Gamma(\Lambda\pi^+\pi^+\pi^-) \qquad \Gamma_8/\Gamma_{24}$$

<u>VALUE</u>	<u>EVTS</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. • • •

$2.6 \pm 1.2$		ALEEV	96	SPEC $n$ nucleus, 50 GeV/c
$4.3 \pm 1.2$	130	ALEEV	84	BIS2 $n$ C 40–70 GeV

$$\Gamma(\Lambda\pi^+\eta)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{25}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.35 ± 0.05 ± 0.06</b>	116	AMMAR	95	CLE2 $e^+e^- \approx \gamma(4S)$
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$$\Gamma(\Sigma(1385)^+\eta)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{26}/\Gamma_2$$

Unseen decay modes of the  $\Sigma(1385)^+$  are included.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.17 ± 0.04 ± 0.03</b>	54	AMMAR	95	CLE2 $e^+e^- \approx \gamma(4S)$
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$$\Gamma(\Lambda K^+\bar{K}^0)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{27}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.12 ± 0.02 ± 0.02</b>	59	AMMAR	95	CLE2 $e^+e^- \approx \gamma(4S)$
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$$\Gamma(\Sigma^0\pi^+)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{28}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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**0.20 ± 0.04 OUR AVERAGE**

$0.21 \pm 0.02 \pm 0.04$	196	AVERY	94	CLE2 $e^+e^- \approx \gamma(3S), \gamma(4S)$
$0.17 \pm 0.06 \pm 0.04$		ALBRECHT	92	ARG $e^+e^- \approx 10.4$ GeV

$$\Gamma(\Sigma^+\pi^0)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{29}/\Gamma_2$$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.20 ± 0.03 ± 0.03</b>	93	KUBOTA	93	CLE2 $e^+e^- \approx \gamma(4S)$
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$$\Gamma(\Sigma^+\eta)/\Gamma(\rho K^-\pi^+) \qquad \Gamma_{30}/\Gamma_2$$

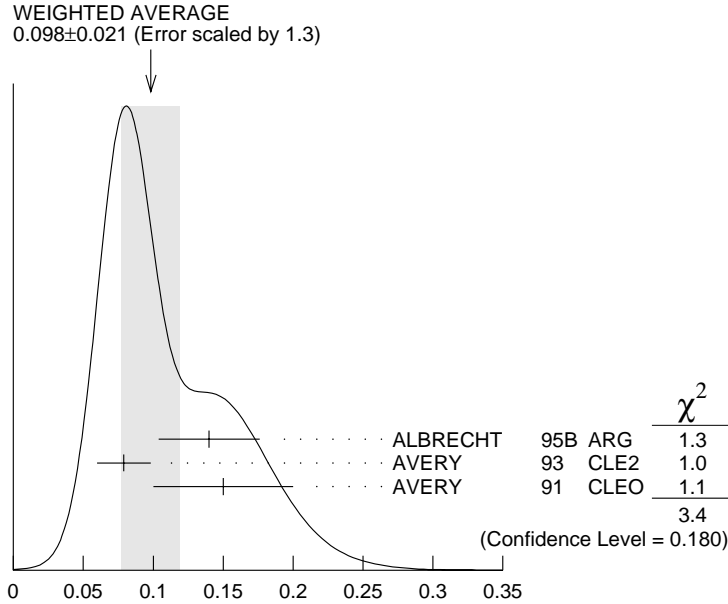
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<b>0.11 ± 0.03 ± 0.02</b>	26	AMMAR	95	CLE2 $e^+e^- \approx \gamma(4S)$
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$\Gamma(\Sigma^+ \pi^+ \pi^-)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{31}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.68±0.09 OUR AVERAGE</b>					
0.74±0.07±0.09	487	KUBOTA	93 CLE2	$e^+ e^- \approx \gamma(4S)$	
0.54 <sup>+0.18</sup> <sub>-0.15</sub>	11	BARLAG	92 NA32	$\pi^- \text{Cu } 230 \text{ GeV}$	
$\Gamma(\Sigma^+ \rho^0)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{32}/\Gamma_2$
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>&lt;0.27</b>					
	95	KUBOTA	93 CLE2	$e^+ e^- \approx \gamma(4S)$	
$\Gamma(\Sigma^- \pi^+ \pi^+)/\Gamma(\Sigma^+ \pi^+ \pi^-)$					$\Gamma_{33}/\Gamma_{31}$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.53±0.15±0.07</b>					
	56	FRABETTI	94E E687	$\gamma \text{Be}, \bar{E}_\gamma \text{ } 220 \text{ GeV}$	
$\Gamma(\Sigma^0 \pi^+ \pi^0)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{34}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.36±0.09±0.10</b>					
	117	AVERY	94 CLE2	$e^+ e^- \approx \gamma(3S), \gamma(4S)$	
$\Gamma(\Sigma^0 \pi^+ \pi^+ \pi^-)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{35}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.21±0.05±0.05</b>					
	90	AVERY	94 CLE2	$e^+ e^- \approx \gamma(3S), \gamma(4S)$	
$\Gamma(\Sigma^+ \omega)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{37}/\Gamma_2$
Unseen decay modes of the $\omega$ are included.					
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.54±0.13±0.06</b>					
	107	KUBOTA	93 CLE2	$e^+ e^- \approx \gamma(4S)$	
$\Gamma(\Sigma^+ \pi^+ \pi^+ \pi^- \pi^-)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{38}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.06<sup>+0.08</sup><sub>-0.04</sub></b>					
	1	BARLAG	92 NA32	$\pi^- \text{Cu } 230 \text{ GeV}$	
$\Gamma(\Sigma^+ K^+ K^-)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{39}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.070±0.011±0.011</b>					
	59	AVERY	93 CLE2	$e^+ e^- \approx 10.5 \text{ GeV}$	
$\Gamma(\Sigma^+ \phi)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{40}/\Gamma_2$
Unseen decay modes of the $\phi$ are included.					
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.069±0.023±0.016</b>					
	26	AVERY	93 CLE2	$e^+ e^- \approx 10.5 \text{ GeV}$	
$\Gamma(\Sigma^+ K^+ \pi^-)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{41}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.13<sup>+0.12</sup><sub>-0.07</sub></b>					
	2	BARLAG	92 NA32	$\pi^- \text{Cu } 230 \text{ GeV}$	
$\Gamma(\Xi^0 K^+)/\Gamma(\rho K^- \pi^+)$					$\Gamma_{42}/\Gamma_2$
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
<b>0.078±0.013±0.013</b>					
	56	AVERY	93 CLE2	$e^+ e^- \approx 10.5 \text{ GeV}$	

$\Gamma(\Xi^- K^+ \pi^+)/\Gamma(\rho K^- \pi^+)$ 
 $\Gamma_{43}/\Gamma_2$ 

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.098±0.021 OUR AVERAGE</b>		Error includes scale factor of 1.3. See the ideogram below.		
0.14 ±0.03 ±0.02	34	ALBRECHT	95B ARG	$e^+ e^- \approx 10.4$ GeV
0.079±0.013±0.014	60	AVERY	93 CLE2	$e^+ e^- \approx 10.5$ GeV
0.15 ±0.04 ±0.03	30	AVERY	91 CLEO	$e^+ e^- 10.5$ GeV


 $\Gamma(\Xi^- K^+ \pi^+)/\Gamma(\rho K^- \pi^+)$ 
 $\Gamma(\Xi(1530)^0 K^+)/\Gamma(\rho K^- \pi^+)$ 
 $\Gamma_{44}/\Gamma_2$ 

 Unseen decay modes of the  $\Xi(1530)^0$  are included.

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.052±0.014 OUR AVERAGE</b>				
0.05 ±0.02 ±0.01	11	ALBRECHT	95B ARG	$e^+ e^- \approx 10.4$ GeV
0.053±0.016±0.010	24	AVERY	93 CLE2	$e^+ e^- \approx 10.5$ GeV

———— Semileptonic modes ————

 $\Gamma(\Lambda \ell^+ \nu_\ell)/\Gamma(\rho K^- \pi^+)$ 
 $\Gamma_{45}/\Gamma_2$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
<b>0.41±0.05 OUR AVERAGE</b>		
0.42±0.07	PDG 98	Our $\Gamma(\Lambda e^+ \nu_e)/\Gamma(\rho K^- \pi^+)$
0.39±0.08	PDG 98	Our $\Gamma(\Lambda \mu^+ \nu_\mu)/\Gamma(\rho K^- \pi^+)$

$\Gamma(\Lambda e^+ \nu_e) / \Gamma(p K^- \pi^+)$ 
 $\Gamma_{46} / \Gamma_2$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.42 ± 0.07 OUR AVERAGE</b>			
0.43 ± 0.08	5,6 BERGFELD	94 CLE2	$e^+ e^- \approx \gamma(4S)$
0.38 ± 0.14	6,7 ALBRECHT	91G ARG	$e^+ e^- \approx 10.4 \text{ GeV}$
<sup>5</sup> BERGFELD 94 measures $\sigma(e^+ e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow \Lambda e^+ \nu_e) = (4.87 \pm 0.28 \pm 0.69) \text{ pb}$ .			
<sup>6</sup> To extract $\Gamma(\Lambda_c^+ \rightarrow \Lambda e^+ \nu_e) / \Gamma(\Lambda_c^+ \rightarrow p K^- \pi^+)$ , we use $\sigma(e^+ e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (11.2 \pm 1.3) \text{ pb}$ , which is the weighted average of measurements from ARGUS (ALBRECHT 96E) and CLEO (AVERY 91).			
<sup>7</sup> ALBRECHT 91G measures $\sigma(e^+ e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow \Lambda e^+ \nu_e) = (4.20 \pm 1.28 \pm 0.71) \text{ pb}$ .			

 $\Gamma(\Lambda \mu^+ \nu_\mu) / \Gamma(p K^- \pi^+)$ 
 $\Gamma_{47} / \Gamma_2$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.39 ± 0.08 OUR AVERAGE</b>			
0.40 ± 0.09	8,9 BERGFELD	94 CLE2	$e^+ e^- \approx \gamma(4S)$
0.35 ± 0.20	9,10 ALBRECHT	91G ARG	$e^+ e^- \approx 10.4 \text{ GeV}$
<sup>8</sup> BERGFELD 94 measures $\sigma(e^+ e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow \Lambda \mu^+ \nu_\mu) = (4.43 \pm 0.51 \pm 0.64) \text{ pb}$ .			
<sup>9</sup> To extract $\Gamma(\Lambda_c^+ \rightarrow \Lambda \mu^+ \nu_\mu) / \Gamma(\Lambda_c^+ \rightarrow p K^- \pi^+)$ , we use $\sigma(e^+ e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow p K^- \pi^+) = (11.2 \pm 1.3) \text{ pb}$ , which is the weighted average of measurements from ARGUS (ALBRECHT 96E) and CLEO (AVERY 91).			
<sup>10</sup> ALBRECHT 91G measures $\sigma(e^+ e^- \rightarrow \Lambda_c^+ X) \cdot B(\Lambda_c^+ \rightarrow \Lambda \mu^+ \nu_\mu) = (3.91 \pm 2.02 \pm 0.90) \text{ pb}$ .			

 $\Gamma(e^+ \text{ anything}) / \Gamma_{\text{total}}$ 
 $\Gamma_{48} / \Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.045 ± 0.017</b>	VELLA	82 MRK2	$e^+ e^- 4.5\text{--}6.8 \text{ GeV}$

 $\Gamma(p e^+ \text{ anything}) / \Gamma_{\text{total}}$ 
 $\Gamma_{49} / \Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.018 ± 0.009</b>	<sup>11</sup> VELLA	82 MRK2	$e^+ e^- 4.5\text{--}6.8 \text{ GeV}$

<sup>11</sup> VELLA 82 includes protons from  $\Lambda$  decay.

 $\Gamma(\Lambda e^+ \text{ anything}) / \Gamma_{\text{total}}$ 
 $\Gamma_{50} / \Gamma$ 

<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. • • •			
0.011 ± 0.008	<sup>12</sup> VELLA	82 MRK2	$e^+ e^- 4.5\text{--}6.8 \text{ GeV}$

<sup>12</sup> VELLA 82 includes  $\Lambda$ 's from  $\Sigma^0$  decay.

———— Inclusive modes ————

 $\Gamma(p \text{ anything}) / \Gamma_{\text{total}}$ 
 $\Gamma_{53} / \Gamma$ 

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.50 ± 0.08 ± 0.14</b>	<sup>13</sup> CRAWFORD	92 CLEO	$e^+ e^- 10.5 \text{ GeV}$

<sup>13</sup> This CRAWFORD 92 value includes protons from  $\Lambda$  decay. The value is model dependent, but account is taken of this in the systematic error.

$\Gamma(p \text{ anything (no } \Lambda))/\Gamma_{\text{total}}$

$\Gamma_{54}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.12 \pm 0.10 \pm 0.16$	CRAWFORD 92	CLEO	$e^+ e^-$ 10.5 GeV

$\Gamma(n \text{ anything})/\Gamma_{\text{total}}$

$\Gamma_{56}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.50 \pm 0.08 \pm 0.14$	<sup>14</sup> CRAWFORD 92	CLEO	$e^+ e^-$ 10.5 GeV

<sup>14</sup>This CRAWFORD 92 value includes neutrons from  $\Lambda$  decay. The value is model dependent, but account is taken of this in the systematic error.

$\Gamma(n \text{ anything (no } \Lambda))/\Gamma_{\text{total}}$

$\Gamma_{57}/\Gamma$

VALUE	DOCUMENT ID	TECN	COMMENT
$0.29 \pm 0.09 \pm 0.15$	CRAWFORD 92	CLEO	$e^+ e^-$ 10.5 GeV

$\Gamma(p \text{ hadrons})/\Gamma_{\text{total}}$

$\Gamma_{55}/\Gamma$

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

$0.41 \pm 0.24$	ADAMOVICH 87	EMUL	$\gamma A$ 20–70 GeV/c
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$\Gamma(\Lambda \text{ anything})/\Gamma_{\text{total}}$

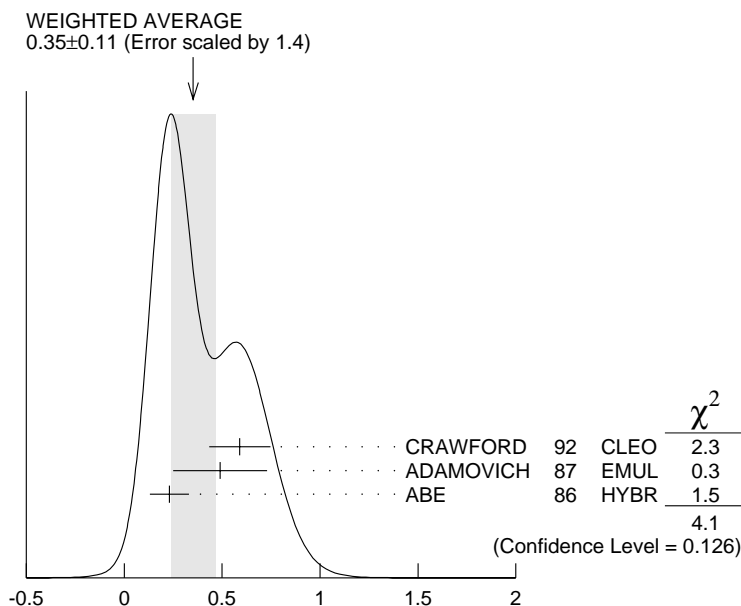
$\Gamma_{58}/\Gamma$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
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**$0.35 \pm 0.11$  OUR AVERAGE** Error includes scale factor of 1.4. See the ideogram below.

$0.59 \pm 0.10 \pm 0.12$		CRAWFORD 92	CLEO	$e^+ e^-$ 10.5 GeV
$0.49 \pm 0.24$		ADAMOVICH 87	EMUL	$\gamma A$ 20–70 GeV/c
$0.23 \pm 0.10$	8 <sup>15</sup>	ABE 86	HYBR	20 GeV $\gamma p$

<sup>15</sup> ABE 86 includes  $\Lambda$ 's from  $\Sigma^0$  decay.



$\Gamma(\Lambda \text{ anything})/\Gamma_{\text{total}}$

$\Gamma(\Sigma^\pm \text{ anything})/\Gamma_{\text{total}}$			$\Gamma_{59}/\Gamma$		
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	
<b>0.1 ± 0.05</b>	5	ABE	86	HYBR 20 GeV $\gamma p$	

————— Rare or forbidden modes —————

$\Gamma(\rho\mu^+\mu^-)/\Gamma_{\text{total}}$			$\Gamma_{60}/\Gamma$		
A test for the $\Delta C=1$ weak neutral current. Allowed by higher-order electroweak interactions.					
VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt; 3.4 × 10<sup>-4</sup></b>	90	0	KODAMA	95	E653 $\pi^-$ emulsion 600 GeV

$\Gamma(\Sigma^-\mu^+\mu^+)/\Gamma_{\text{total}}$			$\Gamma_{61}/\Gamma$		
A test of lepton-number conservation.					
VALUE	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<b>&lt; 7.0 × 10<sup>-4</sup></b>	90	0	KODAMA	95	E653 $\pi^-$ emulsion 600 GeV

### $\Lambda_c^+$ DECAY PARAMETERS

See the "Note on Baryon Decay Parameters" in the neutron Listings.

#### $\alpha$ FOR $\Lambda_c^+ \rightarrow \Lambda\pi^+$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.98 ± 0.19 OUR AVERAGE</b>				
-0.94 ± 0.21 ± 0.12	414	<sup>16</sup> BISHAI	95 CLE2	$e^+e^- \approx \gamma(4S)$
-0.96 ± 0.42		ALBRECHT	92 ARG	$e^+e^- \approx 10.4$ GeV
-1.1 ± 0.4	86	AVERY	90B CLEO	$e^+e^- \approx 10.6$ GeV

<sup>16</sup> BISHAI 95 actually gives  $\alpha = -0.94^{+0.21+0.12}_{-0.06-0.06}$ , chopping the errors at the physical limit  $-1.0$ . However, for  $\alpha \approx -1.0$ , some experiments should *get* unphysical values ( $\alpha < -1.0$ ), and for averaging with other measurements such values (or errors that extend below  $-1.0$ ) should *not* be chopped.

#### $\alpha$ FOR $\Lambda_c^+ \rightarrow \Sigma^+\pi^0$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.45 ± 0.31 ± 0.06</b>	89	BISHAI	95 CLE2	$e^+e^- \approx \gamma(4S)$

#### $\alpha$ FOR $\Lambda_c^+ \rightarrow \Lambda\ell^+\nu_\ell$

The experiments don't cover the complete (or same incomplete)  $M(\Lambda\ell^+)$  range, but we average them together anyway.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>-0.82<sup>+0.11</sup><sub>-0.07</sub> OUR AVERAGE</b>				
-0.82 <sup>+0.09+0.06</sup> <sub>-0.06-0.03</sub>	700	<sup>17</sup> CRAWFORD	95 CLE2	$e^+e^- \approx \gamma(4S)$
-0.91 ± 0.42 ± 0.25		<sup>18</sup> ALBRECHT	94B ARG	$e^+e^- \approx 10$ GeV
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
-0.89 <sup>+0.17+0.09</sup> <sub>-0.11-0.05</sub>	350	<sup>19</sup> BERGFELD	94 CLE2	See CRAWFORD 95

<sup>17</sup> CRAWFORD 95 measures the form-factor ratio  $R \equiv f_2/f_1$  for  $\Lambda_c^+ \rightarrow \Lambda e^+ \nu_e$  events to be  $-0.25 \pm 0.14 \pm 0.08$  and from this calculates  $\alpha$ , averaged over  $q^2$ , to be the above.

<sup>18</sup> ALBRECHT 94B uses  $\Lambda e^+$  and  $\Lambda \mu^+$  events in the mass range  $1.85 < M(\Lambda \ell^+) < 2.20$  GeV.

<sup>19</sup> BERGFELD 94 uses  $\Lambda e^+$  events.

## $\Lambda_c^+$ REFERENCES

We have omitted some papers that have been superseded by later experiments. The omitted papers may be found in our 1992 edition (Physical Review **D45**, 1 June, Part II) or in earlier editions.

PDG	98	EPJ C3 1	C. Caso+	
ALBRECHT	96E	PRPL 276 223	+Andam, Binder, Bockmann+	(ARGUS Collab.)
ALEEV	96	JINRRC 3 31	+Balandin+	(Serpukhov EXCHARM Collab.)
ALEXANDER	96C	PR D53 R1013	+Bebek, Berger+	(CLEO Collab.)
ALBRECHT	95B	PL B342 397	+Hamacher, Hofmann+	(ARGUS Collab.)
AMMAR	95	PRL 74 3534	+Baringer, Bean, Besson+	(CLEO Collab.)
BISHAI	95	PL B350 256	+Fast, Gerndt, Hinson+	(CLEO Collab.)
CRAWFORD	95	PRL 75 624	+Daubenmier, Fulton+	(CLEO Collab.)
KODAMA	95	PL B345 85	+Ushida, Mokhtarani+	(FNAL E653 Collab.)
ALBRECHT	94B	PL B326 320	+Ehrlichmann, Hamacher+	(ARGUS Collab.)
ALEEV	94	PAN 57 1370	+Balandin+	(Serpukhov BIS-2 Collab.)
		Translated from YF 57 1443.		
AVERY	94	PL B325 257	+Freyberger, Rodriguez+	(CLEO Collab.)
BERGFELD	94	PL B323 219	+Eisenstein, Gollin, Ong+	(CLEO Collab.)
FRABETTI	94E	PL B328 193	+Cheung, Cumalat+	(FNAL E687 Collab.)
AVERY	93	PRL 71 2391	+Freyberger, Rodriguez+	(CLEO Collab.)
BOZEK	93	PL B312 247	+Barlag, Becker, Boehringer+	(CERN NA32 Collab.)
FRABETTI	93D	PRL 70 1755	+Cheung, Cumalat+	(FNAL E687 Collab.)
FRABETTI	93H	PL B314 477	+Cheung, Cumalat+	(FNAL E687 Collab.)
KUBOTA	93	PRL 71 3255	+Lattery, Nelson, Patton+	(CLEO Collab.)
ALBRECHT	92	PL B274 239	+Ehrlichmann, Hamacher, Krueger+	(ARGUS Collab.)
ALBRECHT	92O	ZPHY C56 1	+Cronstroem, Ehrlichmann+	(ARGUS Collab.)
BARLAG	92	PL B283 465	+Becker, Bozek, Boehringer+	(ACCMOR Collab.)
CRAWFORD	92	PR D45 752	+Fulton, Jensen, Johnson+	(CLEO Collab.)
JEZABEK	92	PL B286 175	+Rybicki, Rylko	(CRAC)
ALBRECHT	91G	PL B269 234	+Ehrlichmann, Hamacher+	(ARGUS Collab.)
AVERY	91	PR D43 3599	+Besson, Garren, Yelton+	(CLEO Collab.)
ALVAREZ	90	ZPHY C47 539	+Barate, Bloch, Bonamy+	(CERN NA14/2 Collab.)
ALVAREZ	90B	PL B246 256	+Barate, Bloch, Bonamy+	(CERN NA14/2 Collab.)
ANJOS	90	PR D41 801	+Appel, Bean+	(FNAL E691 Collab.)
AVERY	90B	PRL 65 2842	+Besson, Garren, Yelton, Kinoshita+	(CLEO Collab.)
BARLAG	90D	ZPHY C48 29	+Becker, Boehringer, Bosman+	(ACCMOR Collab.)
FRABETTI	90	PL B251 639	+Bogart, Cheung, Coteus+	(FNAL E687 Collab.)
BARLAG	89	PL B218 374	+Becker, Boehringer, Bosman+	(ACCMOR Collab.)
AGUILAR-...	88B	ZPHY C40 321	Aguilar-Benitez, Allison, Bailly+	(LEBC-EHS Collab.)
Also	87	PL B189 254	Aguilar-Benitez, Allison, Bailly+	(LEBC-EHS Collab.)
Also	87B	PL B199 462	Aguilar-Benitez, Allison, Bailly+	(LEBC-EHS Collab.)
Also	88	SJNP 48 833	Begalli, Otter, Schulte, Gensch+	(LEBC-EHS Collab.)
		Translated from YAF 48 1310.		
ALBRECHT	88C	PL B207 109	+	(ARGUS Collab.)
ANJOS	88B	PRL 60 1379	+Appel+	(FNAL E691 Collab.)
ADAMOVICH	87	EPL 4 887	+Alexandrov, Bolta+	(Photon Emulsion Collab.)
Also	87	SJNP 46 447	+Viaggi, Gessaroli+	(Photon Emulsion Collab.)
		Translated from YAF 46 799.		
AMENDOLIA	87	ZPHY C36 513	+Bagliesi, Batignani, Beck+	(CERN NA1 Collab.)
JONES	87	ZPHY C36 593	+Jones, Kennedy, O'Neale+	(CERN WA21 Collab.)
ABE	86	PR D33 1	+	(SLAC Hybrid Facility Photon Collab.)
BOWCOCK	85	PRL 55 923	+Giles, Hassard, Kinoshita+	(CLEO Collab.)
ALEEV	84	ZPHY C23 333	+Arefiev, Balandin, Berdyshev+	(BIS-2 Collab.)
BOSETTI	82	PL 109B 234	+Graessler+	(AACH3, BONN, CERN, MPIM, OXF)
VELLA	82	PRL 48 1515	+Trilling, Abrams, Alam+	(SLAC, LBL, UCB)
BASILE	81B	NC 62A 14	+Romeo+	(CERN, BGNA, PGIA, FRAS)
CALICCHIO	80	PL 93B 521	+	(BARI, BIRM, BRUX, CERN, EPOL, RHEL+)