Baryon Full Listings

Λ_c^+

CONSTRAINED FIT INFORMATION

An overall fit to 7 branching ratios uses 14 measurements and one constraint to determine 5 parameters. The overall fit has a $\chi^2 = 12.8$ for 10 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\rm total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_7	36			
x_{23}	61	22		
x_{51}	25	9	15	
x_{53}	−81	−70	−70	−48
	x_2	x_7	x_{23}	x_{51}

Λ_c^+ BRANCHING RATIOS

$\Gamma(pK^0)/\Gamma(pK^-\pi^+)$ Γ_1/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.49 ± 0.07 OUR AVERAGE					
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	γ Be 70–260 GeV
0.62 ± 0.15 ± 0.03	73	ALBRECHT	88C	ARG	e^+e^- 10 GeV

$\Gamma(pK^-\pi^+)/\Gamma_{\rm total}$ Γ_2/Γ

Most of the other modes are measured relative to this mode.

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.044 ± 0.006 OUR FIT						
0.044 ± 0.006 OUR AVERAGE						
0.0594 ± 0.0031 ± 0.0144			[1] BERGFELD	94	CLEO	$e^+e^- \approx \Upsilon(4S)$
0.040 ± 0.003 ± 0.008			[2] ALBRECHT	92O	ARG	$e^+e^- \approx \Upsilon(4S)$
0.043 ± 0.010 ± 0.008			[3] CRAWFORD	92	CLEO	e^+e^- 10.5 GeV
0.041 ± 0.024		208	[4] ALBRECHT	88E	ARG	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
> 0.044	90	6	[5] AGUILAR-...	88B	LEBC	pp 27.4 GeV
0.022 ± 0.010		39	ABRAMS	80	MRK2	e^+e^- 5.2 GeV

[1] BERGFELD 94 measures $\Gamma(pK^-\pi^+)/\Gamma(\Lambda\ell^+\nu_\ell) = 1.93 \pm 0.10 \pm 0.33$ and calculates $\Gamma(e^+ \text{anything})/\Gamma_{\rm total} = 0.034 \pm 0.004$ from D-meson data, assuming that all charmed hadrons have the same semileptonic width. Combined, these values give $\Gamma(pK^-\pi^+)/\Gamma_{\rm total} = f \times (6.67 \pm 0.35 \pm 1.35)\%$, where $f \equiv \Gamma(\Lambda\ell^+\nu_\ell)/\Gamma(\ell^+ \text{anything})$. Since $f \leq 1$, this gives an upper bound on $\Gamma(pK^-\pi^+)/\Gamma_{\rm total}$. In the spectator model, the quantity corresponding to f in D-meson decay is $\Gamma(D \to (\overline{K}+\overline{K}^*)\ell^+\nu_\ell)/\Gamma(D \to \ell^+ \text{anything}) = 0.89 \pm 0.12$. This value of f leads to the value of $\Gamma(pK^-\pi^+)/\Gamma_{\rm total}$ we give here.

[2] ALBRECHT 92O uses $B(\overline{B} \to \Lambda_c^+ X) \times B(\Lambda_c^+ \to pK^-\pi^+) = (0.28 \pm 0.05)\%$ plus $B(\overline{B} \to \Lambda_c^+ X) = (6.8 \pm 0.5 \pm 0.3)\%$ and assumes that $\overline{B} \to \Xi_c X$ and $\overline{B} \to \Omega_c X$ decays are suppressed and negligible.

[3] CRAWFORD 92 $B(\overline{B} \to \Lambda_c^+ X) \times B(\Lambda_c^+ \to pK^-\pi^+) = (0.273 \pm 0.051 \pm 0.039)\%$ and estimates $B(\overline{B} \to \Lambda_c^+ X) = (6.4 \pm 0.8 \pm 0.8)\%$. If final states other than $\Lambda_c^+ \overline{N} X$ contribute to $\overline{B}$ decay, the $\Lambda_c^+ \to pK^-\pi^+$ branching fraction would increase.

[4] ALBRECHT 88E use their result $B(\overline{B} \to \Lambda_c^+ X) \times B(\Lambda_c^+ \to pK^-\pi^+) = (0.30 \pm 0.12 \pm 0.06)\%$ plus $B(\overline{B} \to \Lambda_c^+ X) = (7.4 \pm 2.9)\%$ from other measurements of inclusive proton and Λ yields in B decays.

[5] This AGUILAR-BENITEZ 88B limit assumes that $\tau_{\Lambda_c} = 1.2 \times 10^{-13}$ s, and it "decreases by 20% [to > 0.035] assuming a lifetime of 1.7×10^{-13} s instead." Our average for τ_{Λ_c} is still higher (see the mean-life section), which would further reduce the limit.

$\Gamma(p\overline{K}^*(892)^0)/\Gamma(pK^-\pi^+)$ Γ_3/Γ_2

Unseen decay modes of the $\overline{K}^*(892)^0$ are included.

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

$\Gamma(\Delta(1232)^{++}K^-)/\Gamma(pK^-\pi^+)$ Γ_4/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.16 ± 0.10 OUR AVERAGE Error includes scale factor of 1.5.					
$0.12^{+0.04}_{-0.05} \pm 0.05$	14	BOZEK	93	NA32	π^- Cu 230 GeV
0.40 ± 0.17	17	BASILE	81B	CNTR	$pp \to \Lambda_c^+ e^- X$

$\Gamma(\Lambda(1520)\pi^+)/\Gamma(pK^-\pi^+)$ Γ_5/Γ_2

Unseen decay modes of the $\Lambda(1520)$ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$0.09^{+0.04}_{-0.03} \pm 0.02$	12	BOZEK	93	NA32	π^- Cu 230 GeV

$\Gamma(pK^-\pi^+ \text{nonresonant})/\Gamma(pK^-\pi^+)$ Γ_6/Γ_2

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

$\Gamma(p\overline{K}^0\pi^+\pi^-)/\Gamma(pK^-\pi^+)$ Γ_7/Γ_2

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.54 ± 0.17 OUR FIT Error includes scale factor of 1.4.						
0.49 ± 0.17 OUR AVERAGE Error includes scale factor of 1.4.						
0.43 ± 0.12 ± 0.04		83	AVERY	91	CLEO	e^+e^- 10.5 GeV
0.98 ± 0.36 ± 0.08		12	BARLAG	90D	NA32	π^- 230 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 1.7	90		ANJOS	90	E691	γ Be 70–260 GeV

$\Gamma(pK^-\pi^+\pi^0)/\Gamma_{\rm total}$ Γ_8/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	44	AMENDOLIA	87	SPEC	γ Ge-Si

$\Gamma(pK^*(892)^-\pi^+)/\Gamma_{\rm total}$ Γ_9/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	1	CNOPS	79	DBC	νN in BNL 7-ft

$\Gamma(p(K^-\pi^+)_{\rm nonresonant}\pi^0)/\Gamma(pK^-\pi^+)$ Γ_{10}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.73 ± 0.12 ± 0.05	67	BOZEK	93	NA32	π^- Cu 230 GeV

$\Gamma(\Delta(1232)\overline{K}^*(892))/\Gamma_{\rm total}$ Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	35	AMENDOLIA	87	SPEC	γ Ge-Si

$\Gamma(pK^-\pi^+\pi^+\pi^-)/\Gamma(pK^-\pi^+)$ Γ_{12}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.022 ± 0.015		BARLAG	90D	NA32	π^- 230 GeV

$\Gamma(pK^-\pi^+\pi^0\pi^0)/\Gamma(pK^-\pi^+)$ Γ_{13}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.16 ± 0.07 ± 0.03	15	BOZEK	93	NA32	π^- Cu 230 GeV

$\Gamma(pK^-\pi^+\pi^0\pi^0\pi^0)/\Gamma(pK^-\pi^+)$ Γ_{14}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.10 ± 0.06 ± 0.02	8	BOZEK	93	NA32	π^- Cu 230 GeV

$\Gamma(p\pi^+\pi^-)/\Gamma(pK^-\pi^+)$ Γ_{15}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.069 ± 0.036		BARLAG	90D	NA32	π^- 230 GeV

$\Gamma(pf_0(980))/\Gamma(pK^-\pi^+)$ Γ_{16}/Γ_2

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.055 ± 0.036		BARLAG	90D	NA32	π^- 230 GeV

$\Gamma(p\pi^+\pi^+\pi^-\pi^-)/\Gamma(pK^-\pi^+)$ Γ_{17}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.036 ± 0.023		BARLAG	90D	NA32	π^- 230 GeV

$\Gamma(pK^+K^-)/\Gamma(pK^-\pi^+)$ Γ_{18}/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.069 ± 0.024 OUR AVERAGE Error includes scale factor of 1.2.					
0.096 ± 0.029 ± 0.010	30	FRABETTI	93H	E687	γ Be, $\overline{E}_\gamma$ 220 GeV
0.048 ± 0.027		BARLAG	90D	NA32	π^- 230 GeV

$\Gamma(p\phi)/\Gamma(pK^-\pi^+)$ Γ_{19}/Γ_2

Unseen decay modes of the ϕ are included.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.040 ± 0.027		BARLAG	90D	NA32	π^- 230 GeV

$\Gamma(p\phi)/\Gamma(pK^+K^-)$ Γ_{19}/Γ_{18}

Unseen decay modes of the ϕ are included.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 0.58	90	FRABETTI	93H	E687	γ Be, $\overline{E}_\gamma$ 220 GeV

$\Gamma(\Lambda\pi^+)/\Gamma(pK^-\pi^+)$ Γ_{20}/Γ_2

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.180 ± 0.032 OUR AVERAGE						
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	γ Be 70–260 GeV
< 0.16	90		ALBRECHT	88C	ARG	e^+e^- 10 GeV