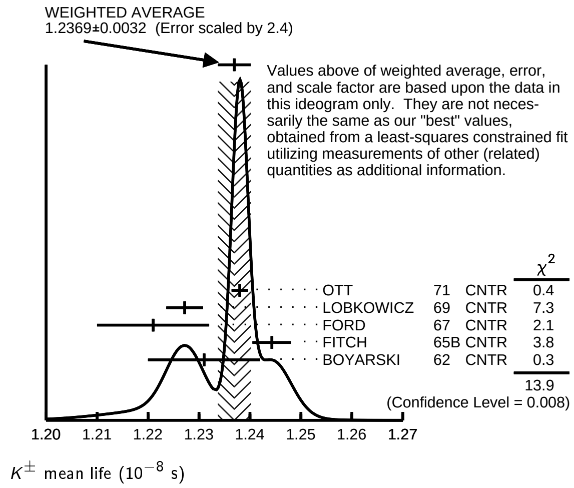
$K^{\pm}$ MEAN LIFE

VALUE (10^{-8} s)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1.2371±0.0029 OUR FIT	Error includes scale factor of 2.2.					
1.2369±0.0032 OUR AVERAGE	Error includes scale factor of 2.4. See the ideogram below.					
1.2380±0.0016	3M	OTT	71	CNTR	+	Stopping K
1.2272±0.0036		LOBKOWICZ	69	CNTR	+	K in flight
1.221 ±0.011		FORD	67	CNTR	±	
1.2443±0.0038		FITCH	65B	CNTR	+	K at rest
1.231 ±0.011		BOYARSKI	62	CNTR	+	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$1.25\ ^{+0.22}_{-0.17}$		[5] BARKAS	61	EMUL		
$1.27\ ^{+0.36}_{-0.23}$	51	[5] BHOWMIK	61	EMUL		
1.31 ±0.08	293	NORDIN	61	HBC	−	
1.24 ±0.07		NORDIN	61	RVUE	−	
1.38 ±0.24	33	[5] FREDEN	60B	EMUL		
1.21 ±0.06		BURROWES	59	CNTR		
1.60 ±0.3	52	[5] EISENBERG	58	EMUL		
$0.95\ ^{+0.36}_{-0.25}$		[5] ILOFF	56	EMUL		

[5] Old experiments with large errors excluded from averaging.



$(\tau_{K^+} - \tau_{K^-})\ /\ \tau_{\text{average}}$

This quantity is a measure of *CPT* invariance in weak interactions.

VALUE (%)	DOCUMENT ID		TECN
0.11 ±0.09 OUR AVERAGE	Error includes scale factor of 1.2.		
0.090±0.078	LOBKOWICZ	69	CNTR
0.47 ±0.30	FORD	67	CNTR

K^+ DECAY MODES

K^- modes are charge conjugates of the modes below.

	Mode		Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\mu^+\nu_\mu$		(63.51 ± 0.18) %	S=1.3
Γ_2	$e^+\nu_e$		$(1.55\pm0.07)\times10^{-5}$	
Γ_3	$\pi^+\pi^0$		(21.16 ± 0.14) %	S=1.1
Γ_4	$\pi^+\pi^+\pi^-$		(5.59 ± 0.05) %	S=1.9
Γ_5	$\pi^+\pi^0\pi^0$		(1.73 ± 0.04) %	S=1.2
Γ_6	$\pi^0\mu^+\nu_\mu$ Called $K^+_{\mu3}$.		(3.18 ± 0.08) %	S=1.5
Γ_7	$\pi^0e^+\nu_e$ Called K^+_{e3}.		(4.82 ± 0.06) %	S=1.3
Γ_8	$\pi^0\pi^0e^+\nu_e$		$(2.1\pm0.4)\times10^{-5}$	
Γ_9	$\pi^+\pi^-e^+\nu_e$		$(3.91\pm0.17)\times10^{-5}$	
Γ_{10}	$\pi^+\pi^-\mu^+\nu_\mu$		$(1.4\pm0.9)\times10^{-5}$	
Γ_{11}	$\pi^0\pi^0\pi^0e^+\nu_e$		$< 3.5\times10^{-6}$	CL=90%
Γ_{12}	$\pi^+\gamma\gamma$	[a]	$< 1\times10^{-6}$	CL=90%
Γ_{13}	$\pi^+3\gamma$	[a]	$< 1.0\times10^{-4}$	CL=90%
Γ_{14}	$e^+\nu_e\nu\overline{\nu}$		$< 6\times10^{-5}$	CL=90%
Γ_{15}	$\mu^+\nu_\mu\nu\overline{\nu}$		$< 6.0\times10^{-6}$	CL=90%
Γ_{16}	$\mu^+\nu_\mu e^+e^-$		$(1.06\pm0.32)\times10^{-6}$	
Γ_{17}	$e^+\nu_e e^+e^-$		$(2.1\ ^{+2.1}_{-1.1})\times10^{-7}$	
Γ_{18}	$\mu^+\nu_\mu\mu^+\mu^-$		$< 4.1\times10^{-7}$	CL=90%
Γ_{19}	$\mu^+\nu_\mu\gamma$	[a,b]	$(5.50\pm0.28)\times10^{-3}$	
Γ_{20}	$\pi^+\pi^0\gamma$	[a,b]	$(2.75\pm0.15)\times10^{-4}$	
Γ_{21}	$\pi^+\pi^0\gamma$(DE)	[a,c]	$(1.8\pm0.4)\times10^{-5}$	
Γ_{22}	$\pi^+\pi^+\pi^-\gamma$	[a,b]	$(1.04\pm0.31)\times10^{-4}$	
Γ_{23}	$\pi^+\pi^0\pi^0\gamma$	[a,b]	$(7.4\ ^{+5.5}_{-2.9})\times10^{-6}$	
Γ_{24}	$\pi^0\mu^+\nu_\mu\gamma$	[a,b]	$< 6.1\times10^{-5}$	CL=90%
Γ_{25}	$\pi^0e^+\nu_e\gamma$	[a,b]	$(2.62\pm0.20)\times10^{-4}$	
Γ_{26}	$\pi^0e^+\nu_e\gamma$(SD)	[d]	$< 5.3\times10^{-5}$	CL=90%
Γ_{27}	$\pi^0\pi^0e^+\nu_e\gamma$		$< 5\times10^{-6}$	CL=90%

Lepton Family number (*LF*), Lepton number (*L*), $\Delta S = \Delta Q$ (*SQ*) violating modes, or $\Delta S = 1$ weak neutral current (*S1*) modes

	Mode			Fraction (Γ_i/Γ)	Confidence level
Γ_{28}	$\pi^+\pi^+e^-\overline{\nu}_e$	*SQ*		$< 1.2\times10^{-8}$	CL=90%
Γ_{29}	$\pi^+\pi^+\mu^-\overline{\nu}_\mu$	*SQ*		$< 3.0\times10^{-6}$	CL=95%
Γ_{30}	$\pi^+e^+e^-$	*S1*		$(2.74\pm0.23)\times10^{-7}$	
Γ_{31}	$\pi^+\mu^+\mu^-$	*S1*		$< 2.3\times10^{-7}$	CL=90%
Γ_{32}	$\pi^+\nu\overline{\nu}$	*S1*		$< 5.2\times10^{-9}$	CL=90%
Γ_{33}	$\mu^-\nu e^+e^+$	*LF*		$< 2.0\times10^{-8}$	CL=90%
Γ_{34}	$\mu^+\nu_e$	*LF*	[e]	$< 4\times10^{-3}$	CL=90%
Γ_{35}	$\pi^+\mu^+e^-$	*LF*		$< 2.1\times10^{-10}$	CL=90%
Γ_{36}	$\pi^+\mu^-e^+$	*LF*		$< 7\times10^{-9}$	CL=90%
Γ_{37}	$\pi^-\mu^+e^+$	*L*		$< 7\times10^{-9}$	CL=90%
Γ_{38}	$\pi^-e^+e^+$	*L*		$< 1.0\times10^{-8}$	CL=90%
Γ_{39}	$\pi^-\mu^+\mu^+$	*L*		$< 1.5\times10^{-4}$	CL=90%
Γ_{40}	$\mu^+\overline{\nu}_e$	*L*	[e]	$< 3.3\times10^{-3}$	CL=90%
Γ_{41}	$\pi^0e^+\overline{\nu}_e$	*L*	[e]	$< 3\times10^{-3}$	CL=90%
Γ_{42}	$\pi^+\gamma$				

[a] See the Full Listings below for the energy limits used in this measurement.

[b] Most of this radiative mode, the low-momentum γ part, is also included in the parent mode listed without γ's.

[c] Direct-emission branching fraction.

[d] Structure-dependent part.

[e] Derived from an analysis of neutrino-oscillation experiments.

CONSTRAINED FIT INFORMATION

An overall fit to the mean life, 2 decay rate, and 20 branching ratios uses 60 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 74.9$ for 53 degrees of freedom.

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

x_3	−58						
x_4	−42	−12					
x_5	−28	−4	22				
x_6	−49	−17	14	2			
x_7	−51	−16	35	7	39		
x_8	−3	−1	2	0	2	6	
Γ	9	3	−21	−5	−3	−7	0
	x_1	x_3	x_4	x_5	x_6	x_7	x_8

	Mode	Rate (10^8 s^{-1})	Scale factor
Γ_1	$\mu^+\nu_\mu$	0.5134 ±0.0020	1.5
Γ_3	$\pi^+\pi^0$	0.1711 ±0.0012	1.2
Γ_4	$\pi^+\pi^+\pi^-$	0.0452 ±0.0004	1.9
Γ_5	$\pi^+\pi^0\pi^0$	0.01400±0.00032	1.2
Γ_6	$\pi^0\mu^+\nu_\mu$ Called $K^+_{\mu3}$.	0.0257 ±0.0006	1.5
Γ_7	$\pi^0e^+\nu_e$ Called K^+_{e3}.	0.0390 ±0.0005	1.3
Γ_8	$\pi^0\pi^0e^+\nu_e$	$(1.70\ ^{+0.34}_{-0.29})\times10^{-5}$	