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VERIFICATION OF AXIAL INTERACTION IN K^+_{e2} DECAYS

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Experiment	Bowen et al.[1]	Botterill et al.[2]	V–A theory (with allowance for radiative corrections
Decay	K^+_{e2}	K^+_{e2}	
Statistics	7	10	
$\Gamma(K^+_{e2})/\Gamma(K^+_{\mu 2})$	—	$\left(1,9\,^{+0.7}_{-0.5}\right)\cdot 10^{-5}$	$2{,}1\cdot 10^{-5}$
$\Gamma(K^-_{e2})/\Gamma_{tot}(K^-)$	$\left(2,1\,^{+1.8}_{-1.3}\right)\cdot 10^{-5}$	$\left(1,2\,^{+0.5}_{-0.3}\right)\cdot 10^{-5}$	$1{,}44\cdot 10^{-5}$
$\lvert f^P/f^A\rvert$ at 95% confidence level.	$3\cdot 10^{-3}$	$2{,}25\cdot 10^{-3}$	0

$R = \Gamma(K^+_{e2})/\Gamma(K^+_{\mu 2})$, $R = 0.815 R_0$ (the coefficient 0.815 is due to the radiative corrections[3]),

$$R_0 = \frac{(M_K^2 - M_e^2)^2}{(M_K^2 - M_\mu^2)^2}\left|\frac{M_e f^A/M_K + f^P}{M_\mu f^A/M_K + f^P}\right|^2, \quad R_{\exp}/R_{\text{theor}} \approx |1 + 10^3 (f^P/f^A)|^2,$$

where f^A and f^P are the axial and pseudoscalar coupling constants, respectively.

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VERIFICATION OF VECTOR INTERACTION IN K^+_{e3} DECAYS

Experiment	Decay	Statistics	Method*	Measurement	2-probability for pure interaction variants			Admixture to amplitude of scalar and tensor interactions	
					Vector V	Scalar S	Tensor T	$\lvert S/L\rvert$	$\lvert T/V\rvert$
Auerbach et al. [1]	$K^0_{L\beta 3}$	~ 100	SC	Pion-lepton angle	0.875	0.112	0.014 (confidence level)	—	—
Firestone et al. [2]	K^0_{Le3}	~ 760	LHC	E_π–E_e Dalitz distribution	35%	~ 0%	~ 0%	—	—
Callahan et al. [3]	$K^+_{\mu 3}$	~ 2650 ~ 440	HLC	μ spectrum π spectrum	30% 70%	1% 1%	1% 1%	—	—
Bellotti et al. [4]	K^+_{e3}	~ 620	HLC	π-ν angle in ν-e cms	25% a 35% b 28% c	1% 1% ~ 0%	~ 0% 0.1% ~ 0%	— < 0.12 < 0.09	— < 0.06 < 0.09
Cester et al. [5]	K^+_{e3}	~ 1680	SC	e^+ spectrum	39%	~ 0%	~ 0%	0.18 at 90% confidence level	0.04
Kalmus and Kernan [6]	K^+_{e3}	~ 515	HLC	π-ν angle in ν-e cms	10%	—	—	0.3 at 95% confidence level	1.1
Eschstruth et al. [7]	K^+_{e3}	~ 4640 ~ 1390	SC	e^+ spectrum e^+ spectrum and π^0 registration	—	—	—	0.15 0.05 at 90% confidence level	0.40 0.07

*SC–spark chamber, LHC–liquid hydrogen chamber, HLC–heavy liquid chamber

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WEAK RADIATIVE DECAYS

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Quantity	Experimental value and Literature reference	Number of events	Remarks, procedure
$\frac{\Gamma(K_L \to 2\gamma)}{\Gamma(K_L \to \text{all})}$	$(7.4\pm1.6)\cdot10^{-4}$ [1]	33	Spark chambers
$\frac{\Gamma(K_L \to 2\gamma)}{\Gamma(K_L \to \text{all})}$	$(1.3\pm0.6)\cdot10^{-4}$ [2]	17	Spark chambers
$\frac{\Gamma(K_L \to \pi^+\pi^-\gamma)}{\Gamma(K_L \to \text{all})}$	$< 3\cdot10^{-3}$ [3]		Confidence 85%; spark chambers
$\frac{\Gamma(K^+ \to \pi^+\pi^0\gamma)}{\Gamma(K^+ \to \text{all})}$	$(2.2\pm0.7)\cdot10^{-4}$ [4]	18	55 MeV $< T_{\pi^+} <$ 80 MeV; freon bubble chamber
$\frac{\Gamma(K^+ \to \pi^+\pi^+\pi^-\gamma)}{\Gamma(K^+ \to \text{all})}$	$(1.0\pm0.4)\cdot10^{-4}$ [5]		$E_\gamma >$ 10 MeV; emulsion
$\frac{\Gamma(K^+ \to \pi^+2\gamma)}{\Gamma(K^+ \to \text{all})}$	$< 1.5\cdot10^{-4}$ [6]		
$\frac{\Gamma(K^+ \to \pi^+e^+e^-)}{\Gamma(K^+ \to \text{all})}$	$< 4\cdot10^{-7}$ [7]		
$\frac{\Gamma(K^+ \to \pi^+\mu^+\mu^-)}{\Gamma(K^+ \to \text{all})}$	$< 3\cdot10^{-6}$ [8]		Confidence, 90%, freon bubble chamber
$\frac{\Gamma(K^+ \to \pi^0e^+\nu\gamma)}{\Gamma(K^+ \to \text{all})}$	$(1.2\pm0.8)\cdot10^{-2}$ [9]		
$\frac{\Gamma(\pi \to \mu\nu\gamma)}{\Gamma(\pi \to \text{all})}$	$(1.24\pm0.25)\cdot10^{-4}$ [10]	26	Emulsion
$\frac{\Gamma(\pi \to e\nu\gamma)}{\Gamma(\pi \to \text{all})}$	$(3.10\pm0.5)\cdot10^{-8}$ [11]	143	Determination of ratio of axial and vector form factors*
$\frac{\Gamma(\Sigma^+ \to p\gamma)}{\Gamma(\Sigma^+ \to p\pi^0)}$	$(0.37\pm0.08)\cdot10^{-2}$ [12]	24	Hydrogen bubble chamber
$\frac{\Gamma(\Sigma^+ \to p\gamma)}{\Gamma(\Sigma^+ \to p\pi^0)}$	$(0.17)\cdot10^{-2}$ [13]	4	Emulsion
$\frac{\Gamma(\Sigma^+ \to n\pi^+\gamma)}{\Gamma(\Sigma^+ \to n\pi^+)}$	$\cong 1.8\cdot10^{-3}$ [14]		$P_{\pi^+} <$ 166 MeV/c; hydrogen bubble chamber
$\frac{\Gamma(\Sigma^- \to n\pi^-\gamma)}{\Gamma(\Sigma^- \to n\pi^-)}$	$\cong 1.1\cdot10^{-3}$ [15]		$P_{\pi^-} <$ 166 MeV/c; hydrogen bubble chamber

*a/F = −2.0 ± 0.1; or a/F = 0.3 ± 0.1. For notation see the paper of A. T. Fillipov at this seminar.

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