QUADRATIC COEFFICIENT h FOR $K^0_L \to \pi^+\pi^-\pi^0$

VALUE	EVTS	DOCUMENT ID		TECN
0.079±0.007 OUR AVERAGE				
0.095±0.032	6499	CHO	77	HBC
0.048±0.036	4709	PEACH	77	HBC
0.079±0.007	509k	MESSNER	74	ASPK
• • • We do not use the following data for averages, fits, limits, etc. • • •				
−0.011±0.018	29k	[56] ALBROW	70	ASPK
0.043±0.052	4400	[56] SMITH	70	OSPK

See notes in section "LINEAR COEFFICIENT g FOR $K^0_L \to \pi^+\pi^-\pi^0$ |MATRIX ELEMENT$|^2$" above.

[56] Quadratic coefficients h and k required by some experiments. (See section on "QUADRATIC COEFFICIENT k" below.) Correlations prevent us from averaging results of fits not including g, h, and k terms.

QUADRATIC COEFFICIENT k FOR $K^0_L \to \pi^+\pi^-\pi^0$

VALUE	EVTS	DOCUMENT ID		TECN
0.0098±0.0018 OUR AVERAGE				
0.024 ±0.010	6499	CHO	77	HBC
−0.008 ±0.012	4709	PEACH	77	HBC
0.0097±0.0018	509k	MESSNER	74	ASPK

LINEAR COEFFICIENT j FOR $K^0_L \to \pi^+\pi^-\pi^0$ (CP-VIOLATING TERM)

Listed in CP-violation section below.

QUADRATIC COEFFICIENT h FOR $K^0_L \to \pi^0\pi^0\pi^0$

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN
−3.3±1.1±0.7	5M	[57] SOMALWAR	92	E731

[57] SOMALWAR 92 chose m_{π^+} as normalization to make it compatible with the Particle Data Group $K^0_L \to \pi^+\pi^-\pi^0$ definitions.

K^0_L FORM FACTORS

For discussion, see note on form factors in the $K^\pm$ section of the Full Listings above.

In the form factor comments, the following symbols are used.

f_+ and f_- are form factors for the vector matrix element.

f_S and f_T refer to the scalar and tensor term.

$f_0 = f_+ + f_- t/(m^2_K - m^2_\pi)$.

λ_+, λ_-, and λ_0 are the linear expansion coefficients of f_+, f_-, and f_0.

λ_+ refers to the $K^0_{\mu3}$ value except in the K^0_{e3} sections.

$d\xi(0)/d\lambda_+$ is the correlation between $\xi(0)$ and λ_+ in $K^0_{\mu3}$.

$d\lambda_0/d\lambda_+$ is the correlation between λ_0 and λ_+ in $K^0_{\mu3}$.

t = momentum transfer to the π in units of m^2_π.

DP = Dalitz plot analysis.

PI = π spectrum analysis.

MU = μ spectrum analysis.

POL= μ polarization analysis.

BR = $K^0_{\mu3}/K^0_{e3}$ branching ratio analysis.

E = positron or electron spectrum analysis.

RC = radiative corrections.

λ_+ (LINEAR ENERGY DEPENDENCE OF f_+ IN K^0_{e3} DECAY)

For radiative correction of K^0_{e3} DP, see GINSBERG 67 and BECHERRAWY 70.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0300±0.0016 OUR AVERAGE		Error includes scale factor of 1.2.			
0.0306±0.0034	74k	BIRULEV	81	SPEC	DP
0.025 ±0.005	12k	[58] ENGLER	78B	HBC	DP
0.0348±0.0044	18k	HILL	78	STRC	DP
0.0312±0.0025	500k	GJESDAL	76	SPEC	DP
0.0270±0.0028	25k	BLUMENTHAL	75	SPEC	DP
0.044 ±0.006	24k	BUCHANAN	75	SPEC	DP
0.040 ±0.012	2171	WANG	74	OSPK	DP
0.045 ±0.014	5600	ALBROW	73	ASPK	DP
0.019 ±0.013	1871	BRANDENB...	73	HBC	PI transv.
0.022 ±0.014	1910	NEUHOFER	72	ASPK	PI
0.023 ±0.005	42k	BISI	71	ASPK	DP
0.05 ±0.01	16k	CHIEN	71	ASPK	DP, no RC
0.02 ±0.013	1000	ARONSON	68	OSPK	PI
+0.023 ±0.012	4800	BASILE	68	OSPK	DP, no RC
−0.01 ±0.02	762	FIRESTONE	67	HBC	DP, no RC
+0.01 ±0.015	531	KADYK	67	HBC	e,PI, no RC
$+0.08 \ {}^{+0.10}_{-0.08}$	240	LOWYS	67	FBC	PI
+0.15 ±0.08	577	FISHER	65	OSPK	DP, no RC
+0.07 ±0.06	153	LUERS	64	HBC	DP, no RC
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.029 ±0.005	19k	[58] CHO	80	HBC	DP
0.0286±0.0049	26k	BIRULEV	79	SPEC	Repl. by BIRULEV 81
0.032 ±0.0042	48k	BIRULEV	76	SPEC	Repl. by BIRULEV 81

[58] ENGLER 78B uses an unique K_{e3} subset of CHO 80 events and is less subject to systematic effects.

$\xi_a = f_-/f_+$ (determined from $K^0_{\mu3}$ spectra)

The parameter ξ is redundant with λ_0 below and is not put into the Meson Summary Table.

VALUE	$d\xi(0)/d\lambda_+$	EVTS	DOCUMENT ID		TECN	COMMENT
−0.11±0.09 OUR EVALUATION			From a fit discussed in note on $K_{\ell 3}$ form factors in 1982 edition, PL **111B** (April 1982).			
−0.10±0.09	−12	150k	[59] BIRULEV	81	SPEC	DP
+0.26±0.16	−13	14k	[60] CHO	80	HBC	DP
+0.13±0.23	−20	16k	[60] HILL	79	STRC	DP
−0.25±0.22	−5.9	32k	[61] BUCHANAN	75	SPEC	DP
−0.11±0.07	−17	1.6M	[62] DONALDSON	74B	SPEC	DP
−1.00±0.45	−20	1385	[63] PEACH	73	HLBC	DP
−1.5 ±0.7	−28	9086	[64] ALBROW	72	ASPK	DP
+1.2 ±0.8	−18	1341	[65] CARPENTER	66	OSPK	DP
• • • We do not use the following data for averages, fits, limits, etc. • • •						
+0.50±0.61	unknown	16k	[66] DALLY	72	ASPK	DP
−3.9 ±0.4		3140	[67] BASILE	70	OSPK	DP, indep of λ_+
$-0.68 \ {}^{+0.12}_{-0.20}$	−26	16k	[66] CHIEN	70	ASPK	DP

[59] BIRULEV 81 error, $d\xi(0)/d\lambda_+$ calculated by us from λ_0, λ_+. $d\lambda_0/d\lambda_+ = 0$ used.

[60] HILL 79 and CHO 80 calculated by us from λ_0, λ_+, and $d\lambda_0/d\lambda_+$.

[61] BUCHANAN 75 is calculated by us from λ_0, λ_+ and $d\lambda_0/d\lambda_+$ because their appendix A value -0.20 ± 22 assumes $\xi(t)$ constant, i.e. $\lambda_- = \lambda_+$.

[62] DONALDSON 74B gives $\xi = -0.11 \pm 0.02$ not including systematics. Above error and $d\xi(0)/d\lambda_+$ were calculated by us from λ_0 and λ_+ errors (which include systematics) and $d\lambda_0/d\lambda_+$.

[63] PEACH 73 gives $\xi(0) = -0.95 \pm 0.45$ for $\lambda_+ = \lambda_- = 0.025$. The above value is for $\lambda_- = 0$. K.Peach, private communication (1974).

[64] ALBROW 72 fit has λ_- free, gets $\lambda_- = -0.030 \pm 0.060$ or $\Lambda = +0.15^{+0.17}_{-0.11}$.

[65] CARPENTER 66 $\xi(0)$ is for $\lambda_+ = 0$. $d\xi(0)/d\lambda_+$ is from figure 9.

[66] CHIEN 70 errors are statistical only. $d\xi(0)/d\lambda_+$ from figure 4. DALLY 72 is a reanalysis of CHIEN 70. The DALLY 72 result is not compatible with assumption $\lambda_- = 0$ so not included in our fit. The nonzero λ_- value and the relatively large λ_+ value found by DALLY 72 come mainly from a single low t bin (figures 1,2). The (f_+,ξ) correlation was ignored. We estimate from figure 2 that fixing $\lambda_- = 0$ would give $\xi(0) = -1.4 \pm 0.3$ and would add 10 to χ^2. $d\xi(0)/d\lambda_+$ is not given.

[67] BASILE 70 is incompatible with all other results. Authors suggest that efficiency estimates might be responsible.

$\xi_b = f_-/f_+$ (determined from $K^0_{\mu3}/K^0_{e3}$)

The $K^0_{\mu3}/K^0_{e3}$ branching ratio fixes a relationship between $\xi(0)$ and λ_+. We quote the author's $\xi(0)$ and associated λ_+ but do not average because the λ_+ values differ. The fit result and scale factor given below are not obtained from these ξ_b values. Instead they are obtained directly from the authors $K^0_{\mu3}/K^0_{e3}$ branching ratio via the fitted $K^0_{\mu3}/K^0_{e3}$ ratio $(\Gamma(\pi^\pm\mu^\mp\nu)/\Gamma(\pi^\pm e^\mp\nu))$. The parameter ξ is redundant with λ_0 below and is not put into the Meson Summary Table.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.11±0.09 OUR EVALUATION		From a fit discussed in note on $K_{\ell 3}$ form factors in 1982 edition, PL **111B** (April 1982).			
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.5 ±0.4	6700	BRANDENB...	73	HBC	BR, λ_+=0.019 ± 0.013
−0.08±0.25	1309	[68] EVANS	73	HLBC	BR, λ_+=0.02
−0.5 ±0.5	3548	BASILE	70	OSPK	BR, λ_+=0.02
+0.45±0.28	569	BEILLIERE	69	HLBC	BR, λ_+=0
−0.22±0.30	1309	[68] EVANS	69	HLBC	
$+0.2 \ {}^{+0.8}_{-1.2}$		KULYUKINA	68	CC	BR, λ_+=0
+1.1 ±1.1	389	ADAIR	64	HBC	BR, λ_+=0
$+0.66 \ {}^{+0.9}_{-1.3}$		LUERS	64	HBC	BR, λ_+=0

[68] EVANS 73 replaces EVANS 69.

$\xi_c = f_-/f_+$ (determined from μ polarization in $K^0_{\mu3}$)

The μ polarization is a measure of $\xi(t)$. No assumptions on λ_{+-} necessary, t (weighted by sensitivity to $\xi(t)$) should be specified. In λ_+, $\xi(0)$ parametrization this is $\xi(0)$ for $\lambda_+ = 0$. $d\xi/d\lambda = \xi t$. For radiative correction to μ polarization in $K^0_{\mu3}$, see GINSBERG 73. The parameter ξ is redundant with λ_0 below and is not put into the Meson Summary Table.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
−0.11 ±0.09 OUR EVALUATION		From a fit discussed in note on $K_{\ell 3}$ form factors in 1982 edition, PL **111B** (April 1982).			
+0.178±0.105	207k	[69] CLARK	77	SPEC	POL, $d\xi(0)/d\lambda_+$=+0.68
−0.385±0.105	2.2M	[70] SANDWEISS	73	CNTR	POL, $d\xi(0)/d\lambda_+$=−6
$-1.81 \ {}^{+0.50}_{-0.26}$		[71] LONGO	69	CNTR	POL, t=3.3
• • • We do not use the following data for averages, fits, limits, etc. • • •					
−1.6 ±0.5	638	[72] ABRAMS	68B	OSPK	Polarization
−1.2 ±0.5	2608	[72] AUERBACH	66B	OSPK	Polarization

[69] CLARK 77 $t = +3.80$, $d\xi(0)/d\lambda_+ = \xi(t)t = 0.178\times3.80 = +0.68$.

[70] SANDWEISS 73 is for $\lambda_+ = 0$ and $t = 0$.

[71] LONGO 69 $t = 3.3$ calculated from $d\xi(0)/d\lambda_+ = -6.0$ (table 1) divided by $\xi = -1.81$.

[72] t value not given.