CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 17 measurements and one constraint to determine 2 parameters. The overall fit has a $\chi^2 = 16.5$ for 16 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, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2 | −100

x_1

K^0_S DECAY RATES

$\Gamma(\pi^\pm e^\mp \nu)$ Γ_7

VALUE (10^6 s^{-1})	DOCUMENT ID		TECN	COMMENT
7.48 ± 0.11 OUR EVALUATION	Error includes scale factor of 1.3. From K^0_L measurements, assuming that $\Delta S = \Delta Q$ in K^0 decay so that $\Gamma(K^0_S \to \pi^\pm e^\mp \nu) = \Gamma(K^0_L \to \pi^\pm e^\mp \nu)$.			
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	BURGUN	72	HBC	$K^+ p \to K^0 p \pi^+$
9.3 ± 2.5	AUBERT	65	HLBC	ΔS=ΔQ, *CP* cons. not assumed

$\Gamma(\pi^\pm \mu^\mp \nu)$ Γ_8

VALUE (10^6 s^{-1})	DOCUMENT ID
5.22 ± 0.08 OUR EVALUATION	Error includes scale factor of 1.2. From K^0_L measurements, assuming that $\Delta S = \Delta Q$ in K^0 decay so that $\Gamma(K^0_S \to \pi^\pm \mu^\mp \nu) = \Gamma(K^0_L \to \pi^\pm \mu^\mp \nu)$.

K^0_S BRANCHING RATIOS

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.6861 ± 0.0028 OUR FIT	Error includes scale factor of 1.2.				
0.671 ± 0.010 OUR AVERAGE					
0.670 ± 0.010	3447	[7] DOYLE	69	HBC	$\pi^- p \to \Lambda K^0$
0.70 ± 0.08		COLUMBIA	60B	HBC	
0.68 ± 0.04		CRAWFORD	59B	HBC	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.740 ± 0.024		[7] ANDERSON	62B	HBC	

[7] Anderson result not published, events added to Doyle sample.

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
2.186 ± 0.028 OUR FIT	Error includes scale factor of 1.2.				
2.197 ± 0.026 OUR AVERAGE					
2.11 ± 0.09	1315	EVERHART	76	WIRE	$\pi^- p \to \Lambda K^0$
2.169 ± 0.094	16k	COWELL	74	OSPK	$\pi^- p \to \Lambda K^0$
2.16 ± 0.08	4799	HILL	73	DBC	$K^+ d \to K^0 p p$
2.22 ± 0.10	3068	[8] ALITTI	72	HBC	$K^+ p \to \pi^+ p K^0$
2.22 ± 0.08	6380	MORSE	72B	DBC	$K^+ n \to K^0 p$
2.10 ± 0.11	701	[9] NAGY	72	HLBC	$K^+ n \to K^0 p$
2.22 ± 0.095	6150	[10] BALTAY	71	HBC	$K p \to K^0$ neutrals
2.282 ± 0.043	7944	[11] MOFFETT	70	OSPK	$K^+ n \to K^0 p$
2.10 ± 0.06	3700	MORFIN	69	HLBC	$K^+ n \to K^0 p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.12 ± 0.17	267	[9] BOZOKI	69	HLBC	
2.285 ± 0.055	3016	[11] GOBBI	69	OSPK	$K^+ n \to K^0 p$

[8] The directly measured quantity is $K^0_S \to \pi^+\pi^-/\text{all } K^0 = 0.345 \pm 0.005$.

[9] NAGY 72 is a final result which includes BOZOKI 69.

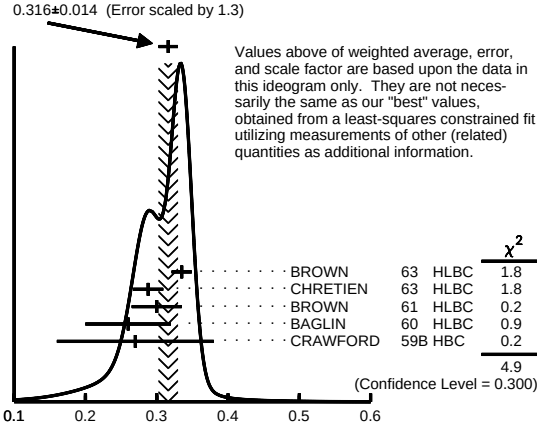
[10] The directly measured quantity is $K^0_S \to \pi^+\pi^-/\text{all } \overline{K}^0 = 0.345 \pm 0.005$.

[11] MOFFETT 70 is a final result which includes GOBBI 69.

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ Γ_2/Γ

VALUE	EVTS	DOCUMENT ID		TECN
0.3139 ± 0.0028 OUR FIT	Error includes scale factor of 1.2.			
0.316 ± 0.014 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
0.335 ± 0.014	1066	BROWN	63	HLBC
0.288 ± 0.021	198	CHRETIEN	63	HLBC
0.30 ± 0.035		BROWN	61	HLBC
0.26 ± 0.06		BAGLIN	60	HLBC
0.27 ± 0.11		CRAWFORD	59B	HBC

WEIGHTED AVERAGE
0.316±0.014 (Error scaled by 1.3)



$\Gamma(\pi^0\pi^0)/\Gamma_{total}$

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-)$ Γ_3/Γ_1

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.60 ± 0.08 OUR AVERAGE					
2.56 ± 0.09	1286	RAMBERG	93	E731	p_γ >50 MeV/c
2.68 ± 0.15		[12] TAUREG	76	SPEC	p_γ >50 MeV/c
2.8 ± 0.6		[13] BURGUN	73	HBC	p_γ >50 MeV/c
3.3 ± 1.2	10	WEBBER	70	HBC	p_γ >50 MeV/c
no ratio given	27	BELLOTTI	66	HBC	p_γ >50 MeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.10 ± 0.22	3723	RAMBERG	93	E731	p_γ >20 MeV/c
3.0 ± 0.6	29	[14] BOBISUT	74	HLBC	p_γ >40 MeV/c

[12] TAUREG 76 find direct emission contribution <0.06, CL = 90%.

[13] BURGUN 73 estimates that direct emission contribution is 0.3 ± 0.6.

[14] BOBISUT 74 not included in average because p_γ cut differs. Estimates direct emission contribution to be 0.5 or less, CL = 95%.

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_4/Γ

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.0024 ± 0.0012		19	BURKHARDT	87	NA31	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.013	90		BALATS	89	SPEC	
< 0.133	90		BARMIN	86B	XEBC	
< 0.2	90		VASSERMAN	86	CALO	$\phi \to K^0_S K^0_L$
< 0.4	90	0	BARMIN	73B	HLBC	
< 0.71	90	0	[15] BANNER	72B	OSPK	
< 2.0	90	0	MORSE	72B	DBC	
< 2.2	90	0	[15] REPELLIN	71	OSPK	
<21.0	90	0	[15] BANNER	69	OSPK	

[15] These limits are for maximum interference in K^0_S-K^0_L to 2γ's.

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_5/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<0.85	90	METCALF	72	ASPK	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.49	90	[16] BARMIN	85	HLBC	K^+ 850 MeV

[16] BARMIN 85 assumes that *CP*-allowed and *CP*-violating amplitudes are equally suppressed.

$\Gamma(3\pi^0)/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN
<0.37	90	BARMIN	83	HLBC
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<4.3	90	BARMIN	73	HLBC

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-)$ Γ_9/Γ_1

Test for $\Delta S = 1$ weak neutral current. Allowed by first-order weak interaction combined with electromagnetic interaction.

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN
< 0.047	90	GJESDAL	73	ASPK
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<20.0	90	BOHM	69	OSPK
< 1.07	90	HYAMS	69B	OSPK
<32.6	90	[17] STUTZKE	69	OSPK
<10.0	90	BOTT-...	67	OSPK

[17] Value calculated by us, using 2.3 instead of 1 event, 90% CL.