TABLES OF EXPERIMENTAL DATA

539.12

EXPERIMENTAL DATA ON THE K → 3π DECAYS

V. V. ANISOVICH

Institute of High-energy Physics, Serpukhov

I. Probabilities of K⁺ → 3π Decays

$\Gamma^+_{++-} = (4.496 \pm 0.030) \times 10^6$ sec^{-1} [9]; R—partial widths; R^+_{++-}—upper sign denotes the charge of the decaying K meson, lower signs denote the charges of the pions.

$R \cdot 10^2$	References	Statistics	$R \cdot 10^2$	References	Statistics
R^+_{++-}			R^+_{00+}		
5.6±0,4	1		2.1±0.5	1	
6.8±0,4	2		2.2±0,4	2	
5.2±0,3	3		1,5±0,2	3	
5.7±0,3	4				
5.54±0,12	5	2332	R^+_{00+}/R^+_{++-}		
5,1±0,2	6		0,30±0,04	4	
5,71±0,15	7		0.35±0,04	6	
6,0±0,4	8		0.303±0,009	26	2027
			0,393±0,099	8	17

II. Probabilities of K^0_2 → 3π Decays

$R \cdot 10^2$	References	Statistics	$R \cdot 10^2$	References	Statistics
R^0_{+-0}			R^0_{000}/R sec^{-1}		
0,185±0,038	11	59	0,24±0,08	13	24
0,151±0.020	12	79	0,31±0,06	24	
0,157±0,030	14	75			
0.15±0.03	17	66	Γ^0_{000}		
0,159±0,015	18	326	(5,22±1,03)·10⁶ sec⁻¹	10	54
0,178±0,017	20	566			
0.144±0,004	21		Γ^0_{+-0}		
0,162±0,015	22	126	(3,26±0,77)·10⁶ sec⁻¹	16	18
0,17±0,03	24	180	(1,4±0,4)·10⁶ sec⁻¹	19	14
0,161±0,005	25	1729	(2,6±0.28)·10⁶ sec⁻¹	10	136
R^0_{000}/R^0_{+-0}			(2.54±0.43)·10⁶ sec⁻¹	23	
2,0±0,6	27	188			

III. Slopes in Spectra of K → 3π Decays

$$\frac{dN}{d\Phi} \sim 1 + 2a \frac{M_k T_{max}}{m_\pi^2} \left(\frac{2T_3}{T_{max}} - 1 \right),$$

where T_3—kinetic energy of unpaired pion in the K-meson rest system, dN/dΦ—number of events with given T_3, divided by the phase volume.

a	References	Statistics	a	References	Statistics
a^0_{+-0}			a^+_{++-}		
−0,24±0.09	14	83	0,105±0,015	28, 35	899
−0,24±0.09	12	79	0,114±0.02	29	1347
−0.24±0,04	18	326	0,083±0,028	30	948
−0,27±0.05	21		0,083±0,015	31	3587
−0,24±0.05	33				
−0,17±0.06	20	566			
−0,26±0,06	10	136	a^+_{00+}		
−0.294±0,018	25	1729	−0,24±0,02	32	1874
−0,21±0.02	34	1198	−0,30±0.05	26	1792
−0,29±0.06	15	280			
−0,30±0,05	22	126			

IV. Verification of CP in K → 3π Decays

a) $\frac{R^-_{--+}}{R^+_{++-}} = \begin{matrix} 1.005 \pm 0.009 \text{ [36]}, \\ 1.0004 \pm 0.0021 \text{ [9]}. \end{matrix}$

b) Charge asymmetry in $K_L \to \pi^+\pi^-\pi^0$ decay (N^+_-—number of events with $T^+ > T^-$, N^-_+—number of events with $T^- > T^+$):

K_L energy, GeV	$N^\pm_-$	N^-_+	$N^-_+/N^\pm_-$	References
~0.8	593	605	1.02±0.04	34
~2.0	607	591	0.96±0.04	34

if $\frac{dN}{d\Phi} \sim 1 + 2a_\pm \frac{M_k T_{max}}{m_\pi^2} \left(\frac{2T_\pm}{T_{max}} - 1 \right)$, then

a_+	a_-	Statistics	References
0,13±0,02	0,21±0,02	1729	25

c) $K^0_1 \to \pi^+\pi^-\pi^0$ decay:

$$\frac{A(K^0_1 \to \pi^+\pi^-\pi^0)}{A(K^0_2 \to \pi^+\pi^-\pi^0)} = x + iy.$$

x	y	Statistics	References
0,25±0,65	1,00±0,65	18	16
0,25±0.55*)	0.80±0,55 *)		
—	$-0.34^{+0,19}_{-0,59}$	136	10

*Assuming the ΔT = ½ rule holds.

[1] R. W. Birge, D. H. Perkins and J. R. Peterson et al., Nuovo Cimento 4, 834 (1956).
[2] G. Alexander, R. H. W. Jonston and C. O'Ceallaigh, Nuovo Cimento 6, 478 (1957).
[3] S. Taylor, G. Harris and J. Orear et al., Phys. Rev. 114, 359 (1959).
[4] B. P. Roe, D. Sinclair and J. L. Brown et al., Phys. Rev. Lett. 7, 346 (1961).
[5] A. Callahan, R. March and R. Stark, Phys. Rev. B136, 1463 (1964).
[6] F. S. Shaklee, G. L. Jensen, B. P. Roe and D. Sinclair, Phys. Rev. B136, 1423 (1964).
[7] A. De Marco-Trabucco, C. Grosso and G. Rinaudo, Phys. Rev. B140, 1480 (1965).
[8] Yong, Preprint UCRL 16362 (1965).
[9] W. T. Ford, A. Lemonick, U. Nauenberg and P. A. Piroul, Phys. Rev. Lett. 18, 1214 (1967).
[10] L. Behr, V. Brisson and P. Petiau et al., Phys. Lett. 22, 540 (1966).
[11] D. Astier et al., Proc. of the Aix-en-Provence International Conference on Elementary Particle, 1961, p. 227.
[12] R. Adair and L. B. Leipuner, Phys. Lett. 12, 67 (1964).
[13] M. Kh. Anikina, M. S. Zhuravleva and D. M. Kotlyarevskiĭ, Zh. Eksp. Teor. Fiz. 46, 59 (1964) [Sov. Phys.-JETP 19, 42 (1964)].

[14] D. Luers, I. S. Mittra, W. J. Willis and S. S. Yamamoto, Phys. Rev. **B133**, 1276 (1964).
[15] M. Kh. Anikina et al., JINR 2339, 1966.
[16] S. A. Anderson, F. S. Crawford, Jr. and R. L. Golden, Phys. Rev. Lett. 14, 475 (1965).
[17] P. Astbury, G. Finocchiaro and R. D. Fortune et al., Phys. Lett. 16, 80 (1965).
[18] P. Astbury, A. Michelini and C. Verkern et al., Phys. Lett. 18, 175 (1965).
[19] P. Franzini, L. Kirsch and P. Schmidt et al., Phys. Rev. **B140**, 127 (1965).
[20] P. Guidoni and B. Barnes et al., Proceedings of the International Conference on Weak Interactions. Argonne, 1965, p. 49.
[21] H. W. K. Hopkins, T. C. Bacon and F. R. Eisler, Proceedings of the International Conference on Weak Interactions, Argonne, 1965, p. 67.
[22] C. J. B. Hawkins, Phys. Lett. 21, 238 (1966).
[23] Hill, Preprint BNL 10608, 1966.
[24] L. A. Kulyukina, A. N. Mestvirishvili, Tsun-Fan Wu, D. Neagu, N. I. Petrov and V. A. Rusanov, Proceedings of the XIIIth International Conference on High-Energy Physics, Berkeley, 1966, University of California Press 1967, p. 306.
[25] H. W. K. Hopkins, T. C. Bacon and F. R. Eisler, Phys. Rev. Lett. 9, 185 (1967).
[26] V. Bisi, G. Borreani and R. Cester et al., Nuovo Cimento 35, 768 (1965).
[27] A. A. Aleksanyan, A. I. Alikhanyan and I. B. Vartazaryan et al., 12th Intern. Conf. on High-energy Physics, Dubna, 1964, Atomizdat Moscow, 1966, v. 2, p. 102.
[28] S. McKenna, S. Natali and M. O'Connell et al., Nuovo Cimento 10, 763 (1958).
[29] M. Ferro-Luzzi, D. H. Miller and J. J. Murray et al., Nuovo Cimento 22, 1087 (1961).
[30] L. T. Smith, D. J. Prowse and D. H. Stork et al., Phys. Lett. 2, 204 (1962).
[31] Huetter, Phys. Rev. **162**, 1028 (1967).
[32] G. E. Kalmus, A. Kernan and R. T. Pu et al., Phys. Rev. Lett. 13, 99 (1965).
[33] A. Abashian, R. J. Abrams and D. W. Carpenter et al., 12th Internat. Conf. on High-energy Physics, Dubna, 1964.
[34] B. M K. Nefkens, A. Abashian and R. J. Abrams, Phys. Rev. 157, 123 (1967).
[35] M. Baldo-Geolin, A. Bonetti and W. D. B. Greening et al., Nuovo Cimento 6, 84 (1957).
[36] C. R. Fletcher, R. W. Beier and R. T. Edwards et al., Phys. Rev. Lett. 19, 98 (1967).

539.12

PROBABILITIES OF WEAK PROCESSES WITH NEUTRAL LEPTON CURRENTS

E. P. SHABALIN

Institute of Theoretical and Experimental Physics, Moscow

Process	Relative probability Γ_i/Γ_{tot}, literature	Ratio to transition with charged lepton current	Proposed value of $\Gamma_i^{e-m}/\Gamma_{tot}$, due to virtual photons, literature
1. $K_L^0 \to \mu^+\mu^-$	$< 1.6\cdot10^{-6}$ [1]	$\Gamma_1/\Gamma\,(K^+_{\mu\nu}) < 5.4\cdot10^{-7}$	$\sim 10^{-8}$ [1,9]
2. $K_L^0 \to e^+e^-$	$< 1.8\cdot10^{-5}$ [1]	$\Gamma_2/\Gamma\,(K^+_{e\nu}) < 0.2$	$< 10^{-11}$ [6]
3. $K_S^0 \to \mu^+\mu^-$	$< 7.3\cdot10^{-5}$ [1]	$\Gamma_3/\Gamma\,(K_{\mu\nu}) < 0.016$	$\sim 10^{-8}$ [7]
4. $K_L^0 \to \mu^\pm e^\mp$	$< 9\cdot10^{-6}$ [1]		$\sim 0{,}25\cdot10^{-7}$ [7]
5. $K^+ \to \pi^+\mu^+\mu^-$	$< 1.3\cdot10^{-6}$ [2]	$\Gamma_5/\Gamma\,(K^+_{\pi e\nu}) < 3.8\cdot10^{-5}$	$\sim 10^{-7}$ [8]
6. $K^+ \to \pi^+e^+e^-$	$< 1{,}6\cdot10^{-6}$ [2]	$\Gamma_6/\Gamma\,(K^+_{\pi e\nu}) < 3.3\ 10^{-5}$	$\sim 10^{-6}$ [10]
7. $K^+ \to \pi^+ + \nu_e + \bar{\nu}_e$	$< 1.1\cdot10^{-6}$ [3]	$\Gamma_7/\Gamma\,(K^+_{\pi e\nu}) < 0.06$	Negligibly small
8. $\nu_\mu + p \to \nu_\mu + p$	[4,5]	$\sigma_8/\sigma\,(\nu_\mu + n \to \mu + p) < 0.03$	If an intermediate W-boson exists, the ratio is $\leqslant \alpha^2$.
9. $\nu_\mu + p \to \nu_\mu + n + \pi^+$	[4,5]	$\sigma_9/\sigma\,(\nu_\mu + p \to p + \pi^+ + \mu^-) < 0{,}16$	