and 5 t-curves in steps of 0.04 (GeV/c)^2). Figure 2 illustrates the accuracy with which we propose to measure dσ/dt as a function of the energy of elastic pp scattering during the indicated period for gathering the statistics.

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CRITICAL EXPERIMENT FOR THE HYPOTHESIS OF NEUTRAL LEPTON CURRENTS IN CP-ODD |ΔS| = 1 SUPERWEAK INTERACTION

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The absence or appreciable suppression of neutral lepton currents I^0 in weak interactions is an experimental fact. On the other hand, we know at present of no theoretical principles that would exclude these currents from all interactions other than electromagnetic. 1) In this case, any "new" interaction of elementary particle must pass the test for neutral lepton currents. The author has previously formulated [3] the hypothesis that I^0 takes part in the new CP-odd superweak interaction with $|\Delta S| = 1$ [4], from which follow the estimates:

$$w(K^+ \to \pi^+ e^+ e^-;\ \pi^\circ \nu\tilde{\nu})/w(K^+) \approx 2\cdot 10^{-7}, \tag{1}$$

$$w(K_2^\circ \to \pi^\circ e^+ e^-;\ \pi^\circ \nu\nu)/w(K_2^\circ) \approx 10^{-6}; \tag{2}$$

the CP-even decay $K_2^0 \to \mu^+\mu^-$ is forbidden, and for the CP-odd decay we have

$$w(K_1^\circ \to \mu^+\mu^-)/w(K_1^\circ) \sim 2\cdot 10^{-3}\cdot w(K_1^\circ \to \mu^+\mu^-)/w(K_2^\circ) \sim 4\cdot 10^{-8} \tag{3}$$

The search for decay muon pairs on the first few centimeters of the K^0-beam path is a critical experiment for the hypothesis under consideration. The new experimental data

$$w(K_2^\circ \to \mu^+\mu^-)/w(K_2^\circ) < (2{,}5 - 8)\cdot 10^{-6} \tag{4}$$

given in the rapporteur paper of Cabibbo [5], offers evidence that this critical experiment can apparently be realized. In this connection, the following remarks are of interest. As is well known, the presence of strong-interaction symmetry higher than isotopic can lead to suppression of $K \to 2\pi$ decays [6]. In particular, it is easy to verify that if weak hadron currents are components of a unitary octet and singlet in the model of broken isotopic symmetry [7,8], then all the $K \to 2\pi$ decays ($K_1^0 \to 2\pi$, $K^+ \to \pi^+\pi^0$, $K_2^0 \to 2\pi$) are forbidden in the limit of exact unitary symmetry of strong interactions. [2] With this, CP-odd decays in which neutral lepton currents I^0 participate are unitarily allowed and have the estimates given in (1) - (3). From the more general point of view, there are three additional possible cases: 2) $K \to 2\pi$ decays with CP = +1 and CP = -1 are simultaneously unitarily allowed, 3) $K \to 2\pi$ decays with CP = +1 are allowed and with CP = -1 forbidden, 4) $K \to 2\pi$ decays with CP = +1 are forbidden and with CP = -1 are allowed. In case 2), as in the first case, the estimates (1) - (3) remain in force. In case 3) these estimates are increased by one order of magnitude, in view of the increase in the coupling constant f [7,8]. It is possible that in this case the estimate for $K_2^0 \to \pi^0 e^+ e^-$ already disagrees with experiment [5]. In case 4) the estimates (1) - (3) are reduced by one order of magnitude for a similar reason. [3]

Comparison of (2) and (4) [5] shows, apparently, that from the experimental point of view the conditions are favorable for searches of electron pairs from the decay $K_2^0 \to \pi^0 e^+ e^-$, for which the predicted fraction is $\approx 10^{-5} - 10^{-7}$ for the different cases indicated above.

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[1] Elimination of I^0 by suitable choice of the isotopic structure of the weak currents and appropriate determination of the broken isotopic properties of the leptons [1] or of the weak-interaction Lagrangian [2] is not universal.

[2] With this, the strangeness-changing CP-even nonlepton interaction has the following unitary structure (see formula (23) of [8])

$$\Delta L^{(e^2)}(|\Delta S| = 1,\ CP = +1) \approx a_3\, 27_{3/2} + a_2 27_{1/2} + a_1 8^s_{1/2} + \text{c.c.}$$

The coefficients a_3, a_2, and a_1 depend only on the magnitude of the "Cabibbo angle" $\tan\theta$. When $\tan\theta \approx 0.22$, we get $a_3 : a_2 : a_1 \simeq 1 : 25 : 33$. On the other hand, the CP-odd interaction in [8] is the 7th component of an octet.

[3] In the model of [7,8], the theoretically interesting case 3) can be realized, for example, if we make in the strangeness-changing currents the substitution $(V - A) \to (V + A)$

[9]. Then the unitary structure of the strangeness-conserving nonlepton interaction is conserved, and the parity-changing interaction acquires the following structure

$$\Delta L^{(e^2)}(|\Delta S| = 1,\ CP = +1,\ P = -1) = b_3\, 10_{3/2} + b_2\, \overline{10}_{1/2} + b_1\, 8^a_{1/2} + \text{c.c.}$$

and when $\tan\theta = 0.22$ we get $b_3 : b_2 : b_1 \simeq 1 : 18 : 37$. Cases 2) and 4) can be realized, for example, if the current $j^{u(0)}$ [7,8] includes the 8-th or 3-rd component of the octet with (V - A) → (V + A). The questions of unitary symmetry in the model of [7,8] will be considered in greater detail elsewhere.

SMALL ANGLE ELASTIC SCATTERING OF POLARIZED 4-MeV NEUTRONS BY MEDIUM AND HEAVY NUCLEI

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We have carried out experiments aimed at investigating the elastic scattering of polarized 4-MeV neutrons by Cu, In, Sn, Pb, Bi, and U nuclei at scattering angles 2 - 21°. The polarized-neutron source was the D-D reaction (the polarization of the scattered neutrons was ~14.8% [1,2]). It was observed that for all the investigated nuclei the differential cross section shows an appreciable rise at $\theta = 2°$, and in scattering through angles $\theta \leq 6°$ the polarizing ability is appreciable in magnitude and increases with decreasing scattering angle. An analysis of the results on the polarizing ability of nuclei in the angle region 2 - 9° has shown that they are in good agreement with the predictions of Schwinger [3] with respect to the Coulomb scattering of neutrons at small angles, due to the interaction of the magnetic moment of the moving neutron with the Coulomb field of the nucleus [4]. The circles in the figure denote the experimentally obtained differential neutron elastic scattering cross sections. By eliminating the Coulomb-scattering cross sections (calculated with allowance for the angular resolution of the experiment) from the experimental data at $\theta = 6°$, we obtain the values designated by the full squares. The contribution of the Coulomb cross section at larger scattering angles is negligibly small. The differential cross section curves shown in the figure were obtained by multiplying by a suitable normalization factor (from 1.05 to 1.13) the differential cross sections