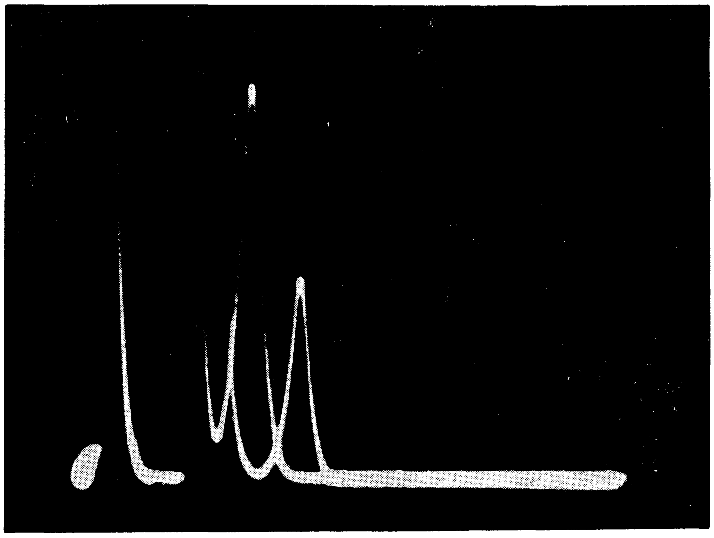

Double exposure of echo signals from F^{19} in CaF_2 single crystal at temperature 0.38°K. The interval between pulses is 70 and 90 μsec; value of T_2 = 136 μsec; crystal axis [111] || H_0.

The 3370 Oe external magnetic field was sufficiently homogeneous (of the order of 10^{-5}) so that the conventional echo could not be observed.

The amplitude of the echo signals is substantially smaller than that of the free precession signal, since not all nuclei participate in the formation of the echo but only those that lie in the field of the ion. The envelope of the echo amplitudes has a Gaussian form and at 0.3°K the times T_2 vary between 90 and 140 μsec, depending on the orientation of the crystal (largest value occurs for [111] || H_0). T_2 decreases from 140 to 70 μsec at 4.2°K.

The width of the echo signal, which characterizes the local field, decreased from 30—40 G at 0.3°K to 20—30 G at 4.2°K; no explicit anisotropy in the width was observed.

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THE η^0 MESON AND THE MASS DIFFERENCE OF THE K_1^0 AND K_2^0 MESONS

S. G. MATINYAN

Institute of Physics, Academy of Sciences, Georgian S.S.R.

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WHEN attempts are made to calculate theoretically the magnitude and sign of the mass difference Δm for the K_1^0 and K_2^0 mesons, it is very important to know the value of the K-π transition constant, which determines the additional mass Δm(K_2^0) of the K_2^0 meson, along with the K_2^0-3π transition and the K_2^0-meson transitions to higher mass states [2]. To calculate the contribution of the one-pion diagram to the K_2^0-meson mass, Bose [3] made the assumption that the non-lepton decay of the Σ hyperon proceeds via its virtual dissociation into a $\bar{K}$ meson and a nucleon with subsequent $\bar{K}$-π transition.

In the present note we wish to use for the estimate of the K-π transition another circumstance, which has been frequently discussed of late. We refer to the single pole mechanism of the η^0- and K-meson decay into three pions [4-9] via a virtual pion. This mechanism is a specific consequence of the recently determined η^0-meson quantum numbers (0^{-+}) and the known selection rule ΔT = ½ in K decay, which lead in both cases to a three-pion state with T = 1. We must note immediately that in spite of the good agreement between experiment and the Dalitz diagrams for both decays [6,8] it is far from definitely demonstrated (cf. [8]) that the model described actually holds, although additional arguments in its favor were presented recently[9] (for example, this model explains quantitatively the degree of deviation from the rule $\Delta T = 1/2$ in $K^+_{\pi 2}$ decay).

Starting from the foregoing consideration, let us estimate the K-π transition constant on the basis of a model in which the K^0_2 meson decays into $\pi^+\pi^-\pi^0$ via an intermediate π^0 meson. If we denote by $f_{K\pi} = g_{K\pi}m^2_\pi$ the K-π transition constant (with dimension of the square of the mass) and by λ the $\pi\pi$ interaction constant introduced by Chew and Mandelstam[10], then we can write for the probability Γ of the $K^0_2 \rightarrow \pi^+\pi^-\pi^0$ decay ($\hbar = c = 1$)[9]

$$\Gamma = \left(\frac{\lambda}{4\pi}\right)^2 \frac{g^2_{K\pi}}{(x^2-1)^2} \frac{1}{24\sqrt{3}}\left(1-\frac{3}{x}\right)^2 m_K, \qquad x = \frac{m_K}{m_\pi}.$$

Taking for Γ the value $\sim 1.5 \times 10^6 \text{ sec}^{-1}$[11] and for $\lambda/4\pi$, for example, the value -0.20 obtained from an analysis of the $\pi\pi$ interaction in the final state of the $p + d \rightarrow He^3 + \pi^+ + \pi^-$ reaction[12], we get $g^2_{K\pi} \approx 10^{-11}$. The one-pion diagram for $\Delta m(K^0_2)$ yields

$$\Delta m^2 (K^0_2) = \frac{g^2_{K\pi}}{x^2-1} m^2_\pi.$$

Hence

$$\Delta m (K^0_2) / m_K \approx 3.3 \cdot 10^{-14}.$$

The experimentally obtained ratio of the mass difference of the K_1 and K_2 mesons $|\Delta m| = |m_1 - m_2|$ to m_K centers at present about the value 10^{-14}. We see that even the one-pion diagram "explains" this value quantitatively.

The question of whether the intermediate states with higher masses make a negligible contribution to Δm or whether some cancellation takes place remains, of course, still open.

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GALVANOMAGNETIC PROPERTIES OF BERYLLIUM

N. E. ALEKSEEVSKIĬ and V. S. EGOROV

Institute of Physics Problems, Academy of Sciences, U.S.S.R.

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THE galvanomagnetic properties of beryllium were investigated by Gruneisen and Adenstedt[1] and by Borovik[2], who observed that the resistance increases in a magnetic field almost quadratically for two directions of the magnetic field relative to the crystal axes. These data imply that beryllium has a closed Fermi surface[3]. Since the data given in [1,2] were far from complete and the measurements were carried out in weak fields, it was considered interesting to carry out a more detailed investigation of the galvanomagnetic properties of beryllium in larger fields.

We have investigated some single-crystal specimens of beryllium with different orientations. The specimens were cut by electric erosion from beryllium crystallites 1) and measured approximately $0.3 \times 0.5 \times 5$ mm. The characteristics of the specimens are listed in the table. The orientation of the specimens was determined by x-ray diffraction with accuracy $\sim 2\%$.

Copper wires were used as the current and