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 $\Delta T = \frac{1}{2}$ 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_2^0 meson decays into $\pi^+\pi^-\pi^0$ via an intermediate π^0 meson. If we denote by $f_{K\pi} = g_{K\pi}m_\pi^2$ 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 $K_2^0 \rightarrow \pi^+\pi^-\pi^0$ decay ($\hbar = c = 1$)[9]

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

Taking for Γ the value $\sim 1.5 \times 10^6$ 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 $g_{K\pi}^2 \approx 10^{-11}$. The one-pion diagram for $\Delta m(K_2^0)$ yields

$$\Delta m^2 (K_2^0) = \frac{g_{K\pi}^2}{x^2-1} m_\pi^2.$$

Hence

$$\Delta m (K_2^0) / m_K \approx 3.3 \cdot 10^{-14}.$$

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

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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

Speci-men	Orientation*		ρ (300 °K)/ρ (4.2 °K)
	θ	ξ	
Be-1	0	0	81
Be-2	0	0	40
Be-3	90	0	88
Be-4	90	0	86

*θ and ξ — polar and azimuthal angles (in degrees).

potential electrodes, which were either spot welded by spark discharge or tightly clamped to the specimen. To produce a reliable mechanical contact, a tinned wire 0.05 mm in diameter was tightly wound around the specimen and soldered. The measurements were carried out at liquid-helium temperatures both in the dc field of an electromagnet and in pulsed fields in a manner similar to one previously used[3,4]. The electric current in the crystal was everywhere perpendicular to the plane of rotation of the magnetic field[2)].

Figure 1 shows a rotation diagram and the dependence of the resistance ρ on the magnetic field for different orientations of the specimen Be-2. The dependence of the resistance on the magnetic field is close to quadratic for both the maximum and the minimum.

Figure 2 shows analogous relationships for the specimen Be-4. Figure 3 shows on a larger scale the dependence of the resistance on the magnetic field for the same specimen, up to fields of 35 kOe.

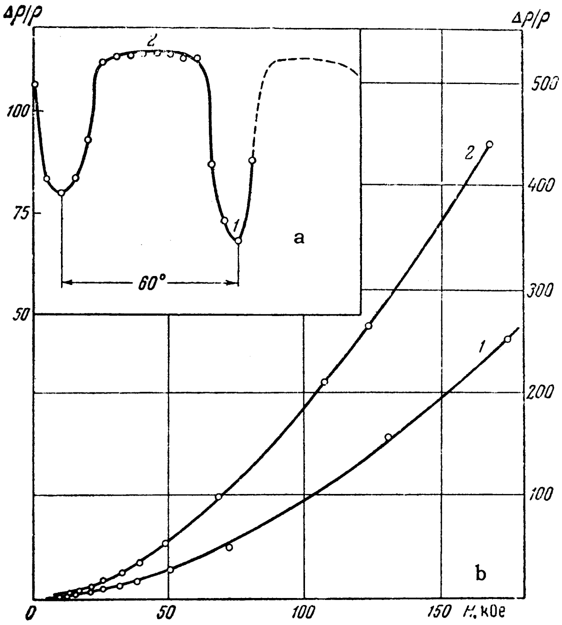

FIG. 1. a – angular diagram for hexagonal specimen Be-2, T = 4.2°K, H = 70 kOe; b – dependence of $\Delta\rho/\rho$ on H for the minimum (1) and maximum (2) of the angular diagram shown in Fig. 1a.

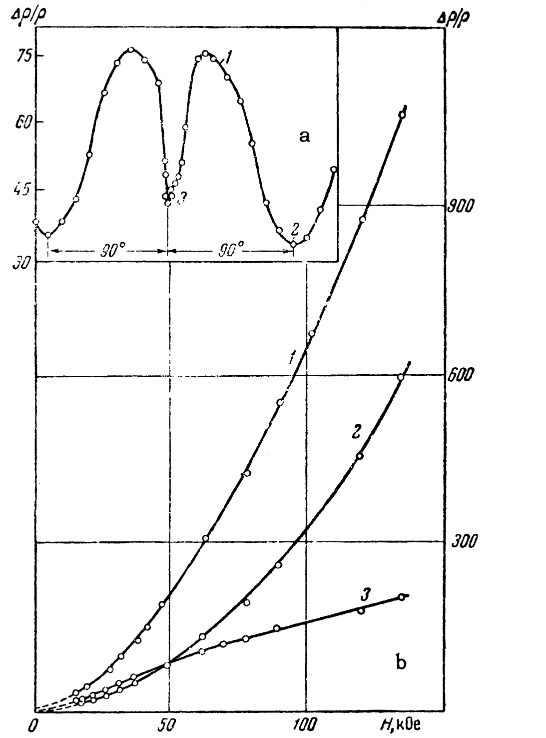

FIG. 2. a – angular diagram for binary specimen Be-4; T = 4.2°K, H = 30 kOe. The magnetic field in direction 3 is perpendicular to the hexagonal axis of the crystal; b – dependence of $\Delta\rho/\rho$ on H for the minima and maximum of the angular diagram shown in Fig. 2a.

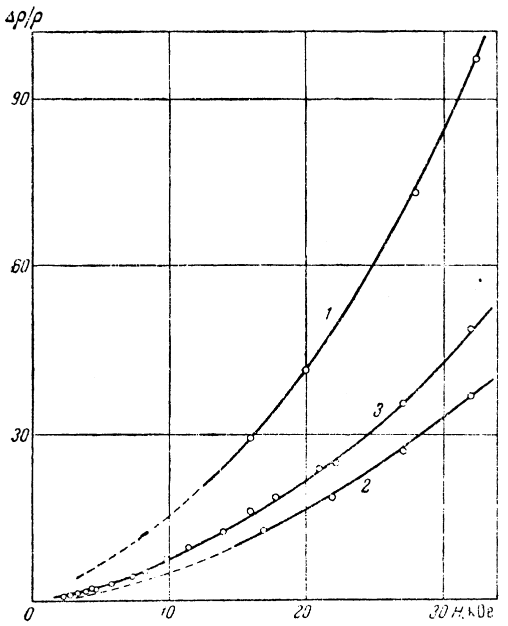

FIG. 3. Dependence of $\Delta\rho/\rho$ on H, shown in Fig. 2b, on an enlarged scale in fields up to 34 kOe.

It is seen from these figures that up to about 35 kOe the increase of the resistance in the magnetic field is close to quadratic for all directions of the magnetic field. Thus, up to 35 kOe beryllium behaves like a metal with a closed Fermi surface.

However, in fields ~ 50 kOe and above, the dependence of the resistance on the field in the [1000] direction exhibits a saturation tendency (see Fig. 2b, curve 3). If we plot $\rho(H)$ in logarithmic coordinates, we find that for the [1000] direction

$$\rho(H) \sim H^{1,6} \text{ for } H \leqslant 50\,\text{kOe},$$

$$\rho(H) \sim H^{0,78} \text{ for } H \geqslant 50\,\text{kOe}.$$

This behavior of $\rho(H)$ can be regarded as a consequence of the fact that in fields larger than 50 kOe open trajectories appear along the hexagonal axis of the beryllium. It is quite probable that this behavior of beryllium is a consequence of "magnetic breakdown," similar to that in rhenium[5].

Thus, the Fermi surface of beryllium consists of two parts: hole and electron. In fields smaller than the 35 kOe, the volumes of these parts are identical. As the field is increased to 50 kOe, open directions parallel to the hexagonal axis appear in the Fermi surface of beryllium.

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1)We take this opportunity to thank B. G. Lazarev, who furnished the initial beryllium crystallites.

2)The deviation of the specimen axis from the direction perpendicular to the plane of rotation of the magnetic field can amount to ~ 5°, owing to the smallness of the specimens.

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CRITICAL MAGNETIC FIELDS OF SUPERCONDUCTING BERYLLIUM FILMS

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An investigation of the electric conductivity of beryllium films has shown that films freshly condensed on a cold substrate exhibit superconductivity[1,3]. Under definite condensation conditions, two superconducting modifications are formed with different superconductivity temperatures (near 6 and near 8°K). The films obtained by such a method have an extreme non-equilibrium state, and the superconducting modifications cannot withstand heating above a definite temperature[3].

It can be assumed that the critical magnetic fields will be very large compared with the fields for equilibrium films of superconducting films, owing to the finely dispersed nature and non-equilibrium of the films, even those having the same thickness.

In the present note we report preliminary results of an investigation of the destruction, by means of a magnetic field, of the superconductivity beryllium films produced by condensation on a substrate cooled with liquid helium. The films were produced by a procedure previously employed[3]. The plane of the film was parallel to the magnetic field. The measuring current in the film was perpendicular to the magnetic field.

The results of measurements on two of the investigated films, having the second superconducting modification ($T_c \sim 6.5°$), are shown in Fig. 1.

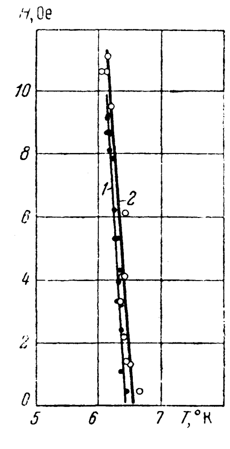

FIG. 1. Curve of destruction of superconductivity of a beryllium film: 1 – film ~900 Å thick, 2 – ~200 Å.