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.

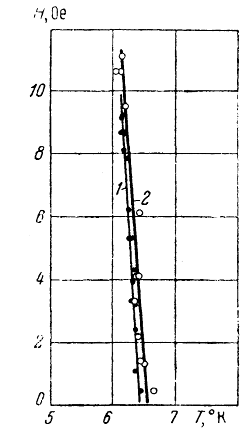


FIG. 1. Curve of destruction of superconductivity of a beryllium film: 1 – film ~900 Å thick, 2 – ~200 Å.

The field intensity (12 kOe) was limited for the time being by the relatively large ampoule dimensions.

As can be seen from the foregoing data, the destruction fields are very large for freshly condensed beryllium films, and $dH_c/dT \sim (32-34) \times 10^3$ Oe/deg. This apparently is a property of all strongly distorted metallic films (for example, Tl)[4].

It is interesting to note, however, that $dH_c/dT$ of beryllium turns out to be independent of the film thickness (at least in the investigated range of thicknesses and temperatures). At the same time, in thallium deposited under analogous conditions, $dH_c/dT$ is just as large, but decreases rapidly with increasing film thickness. The apparent reason for this is that beryllium obtained under such conditions is in a different modification[3], whereas films of thallium, judging from the known data [4,5], have no special modifications.

It can be noted that $dH_c/dT$ of beryllium films is much larger than that of high-temperature superconductors such as $Nb_3Sn$ (16,000 G/deg).

Unfortunately, in the case of superconducting beryllium films it is impossible to consider a comparison with existing[6] theoretical results for the critical fields, since the latter are expressed in terms of the magnetic field for the bulk metal, which is not realizable for beryllium.

The metal in the beryllium film is apparently in the maximally disordered state, i.e., for this film the smallest parameter (for example $l$, the electron mean free path) entering into the theoretical analysis is smaller than the investigated film thickness.


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## *ELASTIC SCATTERING OF* 3.5-BeV/c $\pi^-$ *MESONS BY PROTONS*

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THE study of elastic scattering at high energies in the region of the diffraction maximum has gained in interest recently in connection with the verification of the asymptotic expressions obtained by calculating the Regge-pole trajectories. We have investigated the elastic scattering of 3.5-BeV/c $\pi^-$ mesons by protons. The measurements were made with the aid of a liquid-hydrogen bubble chamber 25 cm in diameter, placed in a 14 kOe magnetic field.

A $\pi^-$-meson beam from the internal target of the proton synchrotron was analyzed in the field of the deflecting magnet and guided through a system of two collimators to the entrance window of the liquid-hydrogen bubble chamber. The momentum scatter in the primary beam was $\sim 1\%$. A total of 40,000 photographs was obtained with an average load of 10—15 $\pi^-$ mesons per chamber expansion. The photographs were scanned twice. The selected two-prong stars were processed with the automatic measuring unit of the Institute of Theoretical and Experimental Physics. The data obtained were fed to an electronic computer. The error in the measurement of the space angles was $\pm 40'$. The error in the measured momentum corresponded to an error $\pm 50\,\mu$ in the measured deflection in the chamber. The elastic scattering was identified by comparing the emission angles and the momenta of the secondary particles with the values expected from the kinematics of elastic scattering. The number of elastic scattering events so selected was 540.

The figure shows the dependence of the differential cross section $d\sigma/dt$ on t, the square of the four-momentum transfer. The momenta for small angles were corrected for the azimuth-angle dependence of the efficiency of observing the events. The total cross section for scattering in the backward hemisphere is $50 \pm 20\,\mu b$. If only the trajectory of the vacuum pole is taken into account, the scattering amplitude has the asymptotic form (see, e.g., [1])