The estimate of the cross sections for processes (3) and particularly (1) obtained in this way is considerably less than that calculated from the diagram, which apparently indicates that other possible processes compete with this diagram. Moreover, the estimates of the cross sections for all three scattering processes are of the same order of magnitude, i.e., there is no difference between processes to which this diagram gives a contribution and those for which a contribution is impossible.

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ANISOTROPY OF THE ODD PHOTOMAGNETIC EFFECT

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It has been shown previously[1,2] that the even photomagnetic effect in germanium is markedly anisotropic. The odd photomagnetic effect is usually considered to be isotropic. When there is a strictly linear variation of the odd photomagnetic e.m.f. on the magnetic field strength, it is expected to be anisotropic for a cubic crystal. However, it is known that for sufficiently strong magnetic fields the odd photomagnetic e.m.f. in germanium ceases to vary linearly with the field, and even passes through a maximum at some value of the field. In these conditions the possibility of anisotropy arising even in the odd photomagnetic effect is not excluded.

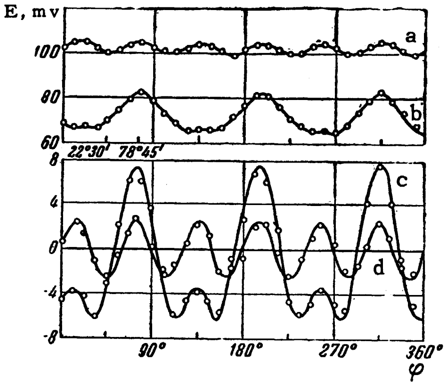

FIG. 1

To clarify the question of the existence of anisotropy in the odd photomagnetic effect, we have studied single-crystal specimens of n- and p-germanium in magnetic fields up to 25 000 oe. The specimens studied, like those described previously,[1] were in the form of circular discs with 32 electrodes around the periphery. The specimens could be rotated about an axis coinciding with the normal to the plane of the disc. The angle φ between the crystallographic axes and the direction of the magnetic field was thereby changed. Also the specimens could be turned so that the angle θ between the normal to the specimen surface and the direction of the magnetic field was changed.

Figure 1a shows the anisotropy curve of the odd effect, i.e., the variation of the odd photomagnetic e.m.f. on the angle φ for a specimen of p-germa-

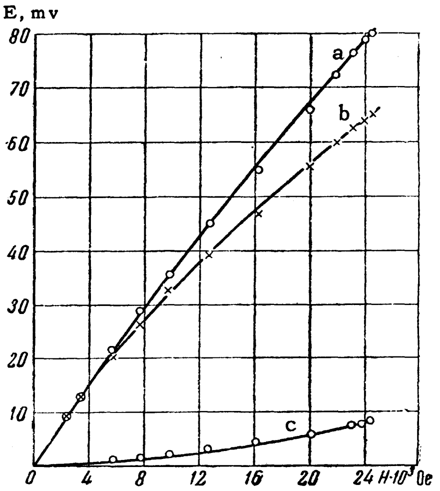

FIG. 2

nium, the [111] axis of which was normal to the plane of the disc, while the normal itself made an angle $\theta = 90^\circ$ with the direction of the magnetic field. The measurements were made at room temperature in a magnetic field of 24,500 oe. The e.m.f. was measured as usual in the direction perpendicular to the magnetic field direction and the direction of illumination. The curve 1b refers to the photomagnetic e.m.f. measured when the angle $\theta \approx 130^\circ$.

By analogy with the anisotropy of the even photomagnetic effect,[2] it was supposed that the measured odd photomagnetic e.m.f. can be regarded as the sum of isotropic and anisotropic components. It is clear that the purely anisotropic component can be obtained by measuring the odd photomagnetic e.m.f. in the direction of the magnetic field or its projection on the plane of the surface. Experiments performed in fact confirmed the presence of an odd photomagnetic e.m.f. when measuring it in the direction of the magnetic field, i.e., in the direction in which there is no isotropic odd photomagnetic effect. The variation of this photomagnetic e.m.f. on the angle φ is given in Fig. 1d (the continuous curve is the function $E = a \sin 6\varphi$). Figure 1c shows the anisotropy curve for the same specimen when $\theta = 75^\circ$ (the continuous curve is the function $E = a \sin 3\varphi + b \sin 6\varphi$).

Curves are given in Fig. 2 showing the variation of the extreme values of the odd photomagnetic e.m.f. with the magnetic field strength. Curves 2a and 2b refer to the photomagnetic e.m.f. measured in the "usual" direction (perpendicular to the magnetic field) for two values of φ: 75° 45′ and 22° 30′ (see Fig. 1b). The specimen was oriented relative to the magnetic field so that $\theta \approx 130^\circ$. For this value of θ the anisotropic component of the photomagnetic e.m.f. attains a maximum value. Curve 2c shows the variation of the extremal value of the purely anisotropic component of the odd photomagnetic e.m.f. on the magnetic field strength when $\theta \approx 130^\circ$.

The curves presented show that the variation of the odd photomagnetic e.m.f. on the magnetic field is essentially nonlinear. To explain the observed anisotropy of the odd photomagnetic effects in strong magnetic fields, it is apparently necessary to include terms of higher odd degree in the magnetic field in a general phenomenological equation of the Kagan-Smorodinskii[3] type.

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RESISTANCE OF THIN SINGLE-CRYSTAL WIRES

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MEASUREMENT of the electrical conductivity of thin metal wires is usually used to determine electron mean free paths.[1] In the standard method for this, the results obtained for the dependence of resistivity on wire diameter are compared with the theoretical curve obtained by Dingle.[2] It must be remembered that Dingle's results were obtained on the assumption of an isotropic, quadratic dispersion law for the electrons. As a result, the ratio ρ/ρ_∞ (ρ_∞ is the resistivity of an infinitely thick wire and ρ that of a wire of diameter d) is expressed as a function of d/λ only (λ is the electron mean free path).

One of us (B. A.) has measured the dependence of the resistivity of tin single crystal wires on diameter. The tin used in the experiments was first subjected to zone refinement.[3] The purity is

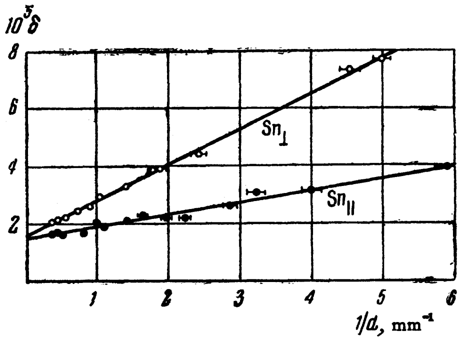

FIG. 1