and to development of an electron cascade. Experiments confirming this mechanism will be described in a separate article.

We note in conclusion that self-focusing cannot be observed in ruby crystals with color centers. The type of damage produced in these crystals at all four frequencies was the same and took the form of characteristic "tracks" consisting of microcracks. The breakdown thresholds were close to $10^9$ W/cm$^2$ at all frequencies, which is apparently lower than the self-focusing thresholds.


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## OSCILLATIONS OF THE PHOTOMAGNETIC EFFECT IN INDIUM ARSENIDE


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We have previously reported [1] oscillations of the photomagnetic effect in InSb. Continuing this research program, we have measured the photomagnetic emf in indium-arsenide single crystals at low temperatures. The first sample, of n-type, had an impurity concentration $10^{16}$ at/cm$^3$ and an electron mobility $2.5\times10^4$ cm$^2$/sec-V. Figure 1 shows the results of measurements of the photomagnetic effect at T = 4.2°K. They show that the oscillations have

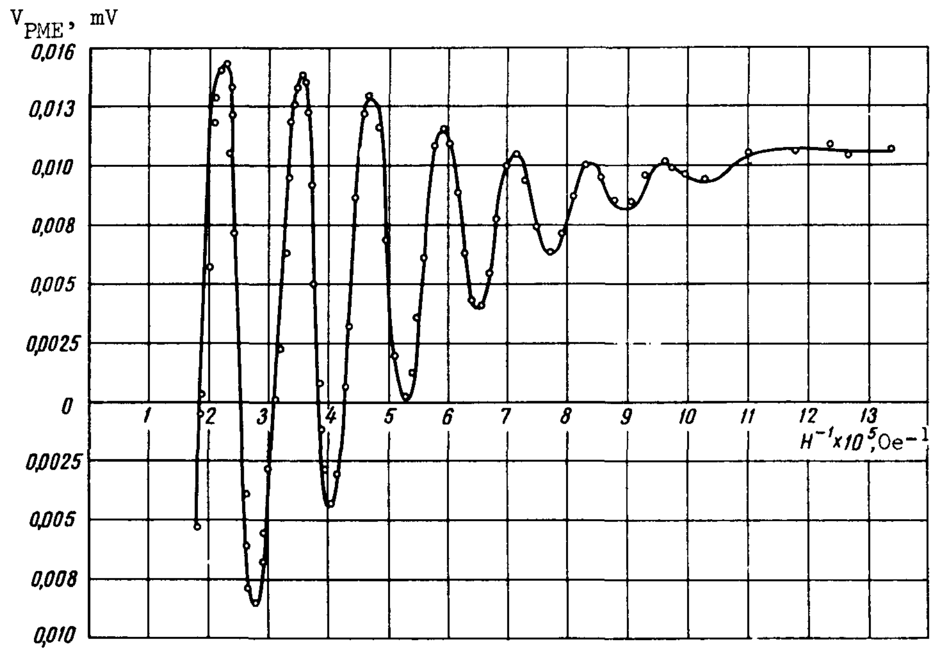


Fig. 1. Odd photomagnetic effect in InAs, n = $9.2\times10^{16}$ cm$^{-3}$, $\mu_n$ = $2.5\times10$ cm$^2$/sec-V, T = 4.2°K

a constant period in terms of 1/H, with value $\Delta(1/H) = 1.4\times10^{-5}$ $G^{-1}$. The measurements were made in a superconducting solenoid* in magnetic fields exceeding 25 kOe. The most significant result of these investigations is the change of the sign of the photomagnetic effect when the field is strong enough. Experiments with indium-arsenide samples having different impurity-atom concentrations n have shown that the oscillation period is inversely proportional to $n^{2/3}$. As is well known, such a dependence of the period on the carrier density is obtained for the Shubnikov - de Haas magnetoresistance oscillations. This means that the oscillations are connected with the Landau levels.

We investigated the even photomagnetic effect with the same samples of indium arsenide. To this end, the sample was placed in a magnetic field in such a way that its plane was inclined 45° to the magnetic field, and the measurements were made in the direction of the projection of the magnetic field on the plane of the sample. The results of these measurements are shown in Fig. 2. It turns out that the oscillating part of the even effect has the same period in the reciprocal field and exceeds in absolute magnitude the odd photomagnetic emf. Yet usually the even effect is much smaller than the odd one. Incidentally, here the even photomagnetic effect is likewise much smaller than the odd one in weak magnetic fields (before the oscillations are observed).

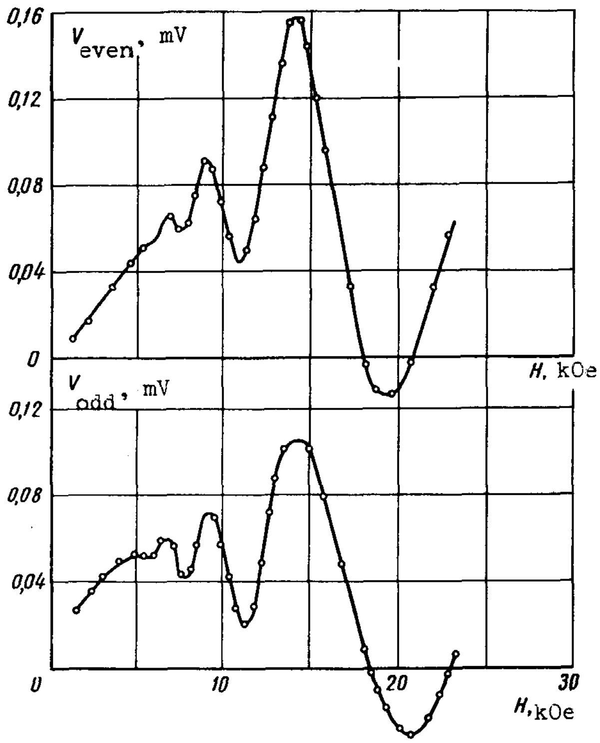


Fig.2. Odd and even photomagnetic effects in InAs, $n = 1.85\times10^{16}$ $cm^{-3}$, $\mu_n = 4.9\times10^4$ $cm^2/sec$, T = 4.2°K, $\Delta(1/H) = 4.3\times10^{-5}$ $G^{-1}$.

No oscillations whatever were observed in measurements of the Hall effect in the same indium arsenide samples. The character of the oscillations remained unchanged when the wavelength of the incident light was varied from the blue part of the spectrum to the red one.

As is well known, the reversal of the sign of the photomagnetic effect should be connected a change in the direction of carrier diffusion (the sign of the photomagnetic emf does not depend on the type of carrier). We are unable as yet to propose a mechanism explaining the observed reversal in the sign of the photomagnetic effect. Experiments are now under way to explain the nature of this phenomenon.

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