phase transition (a decrease of the scattering maximum), but also a shift of the Curie point towards lower temperatures.

The observed shift of the Curie point can be set in correspondence with the influence of the magnetic field on the start of the decrease of magnetization on the plot of the magnetization against the temperature, as observed by Arais [3]. From the data of Arais it follows that the temperature of the start of the decrease of magnetization also decreases like the square of the applied magnetic field. It can be assumed that the shift of the Curie point under the influence of the magnetic field is connected with the influence of dipole-dipole interaction [4], the role of which greatly increases at the phase transition temperature, when the exchange interaction is compensated by the thermal motion.

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OPTICAL OBSERVATION OF PHASE TRANSITION IN SbSI NEAR THE CRITICAL CURIE POINT

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Many presently available experimental results give reasons for assuming that the line of first-order phase transitions in SbSI near the temperature $T = -40°$ C and at a pressure $P = 1500$ atm goes over to the line of the second-order phase transitions. These results pertain also to a number of dielectric measurements. On approaching the point indicated above, the "rule of two" begins to be satisfied, the temperature hysteresis of the phase transition decreases to zero, and the character of the temperature dependence of the spontaneous polarization changes accordingly.

It is known that the most characteristic feature of the ferroelectric phase transition in SbSI, being a first-order transition, is the presence of a structure of alternating phases, observed near the phase transition [1 - 3]. Larkin and Khmel'nitskii [4] have shown that in the first approximation the temperature interval of the coexistence of the phases (and accordingly of the optical observation of the bands) in SbSI is linearly connected with the jump of the width of the forbidden band of the crystal in the phase transition.

In connection with the foregoing, it was of interest to investigate the band structure of SbSI near the phase transition in that pressure interval in which, by assumption [5], the first-order phase transition line goes over to the second-order phase transition line. If the triple points of the diagram of states in SbSI ($P = 1500$ kg/cm^2, $T = -40°$ C) actually corresponds to this effect, then the temperature interval of the coexistence of the phases should decrease as this point is approached, and the band structure itself should vanish near this point.

The investigated SbSI crystal was placed in a thermostatic high-pressure chamber, the construction of which is described in [6]. The chamber made it possible to observe the crystal visually in transmitted monochromatic light at a magnification 25x. The jump in the width of the forbidden band in the phase transition was determined from the temperature dependence of the intrinsic-absorption edge. The source of the monochromatic light was a UM-2 monochromator. The light passing through the crystal was registered with an FEU-38 photomultiplier.

Figure 1 shows microphotographs of the crystal, obtained in polarized light near the phase transition and demonstrating the usual band structure of SbSI, with the phase-separation boundaries along the (101) plane. The six microphotographs on Fig. 1 correspond to six different pressures in the range from 1 to 1500 kg/cm^2. On the diagram of state, these pressures correspond to Curie temperatures in the interval from +23° C to -40° C. As expected, the structure of the band vanishes near the triple point. With this, as seen from Fig. 1, the orientation of the boundaries between phases remains essentially unchanged with changing pressure. Individual observations have shown that with increasing pressure the temperature interval ΔT of the co-existence of the phases decreases continuously and vanishes near the triple point.
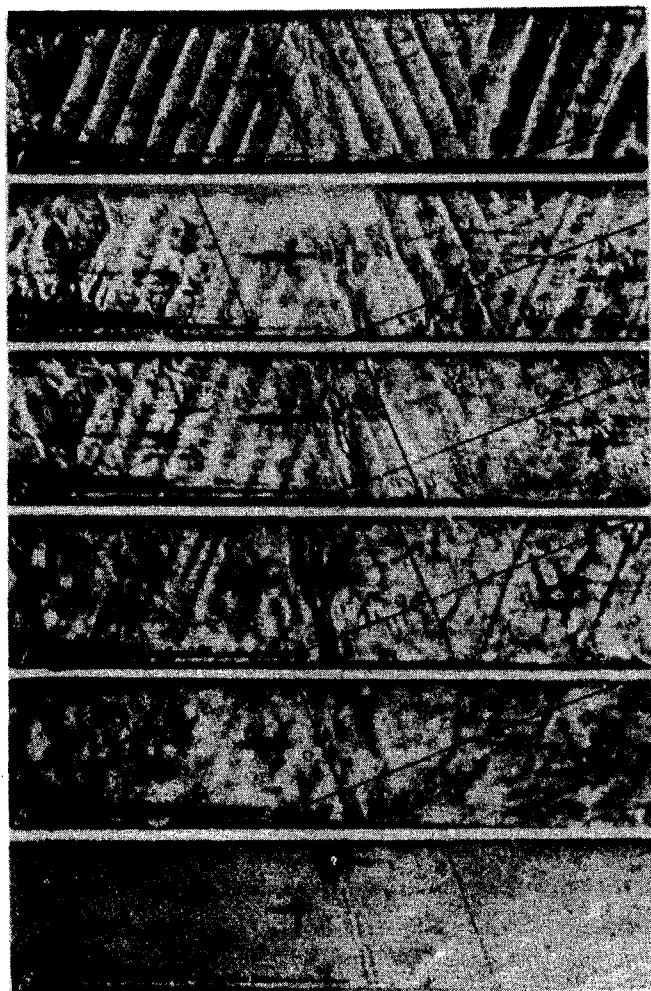

Fig. 1. Microphotograph of an SbSI single crystal at different values of the hydrostatic pressure near the phase-transition temperature: 1 - P = 1 atm, T = 23°C; 2 - 130 atm and 18.5°C; 3 - 150 atm and 90°C; 4 - 1000 atm and -18°C; 5 - 1350 atm and -32.5°C; 6 - 1500 atm and -40°C.

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Fig. 2. Pressure dependence of the jump of the forbidden band ΔE_g (1), of the temperature interval of phase coexistence ΔT (2), and of the ratio $\Delta T/E_g$ (3) for single-crystal SbSI.
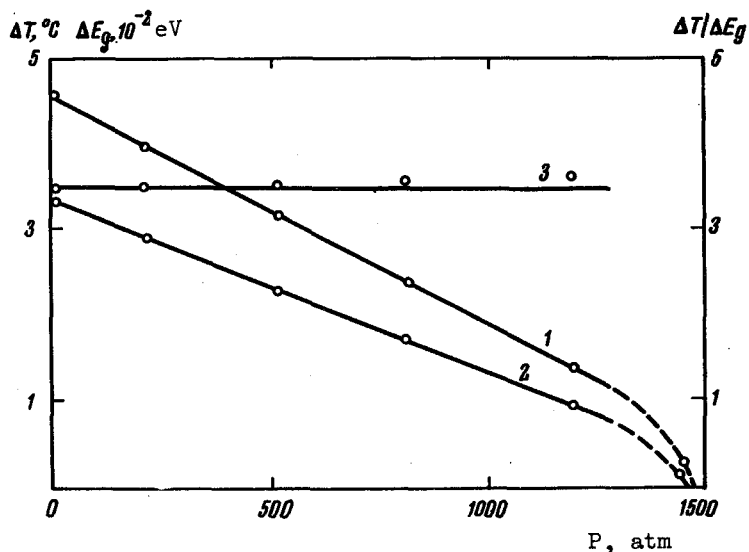
In addition to these observations, we measured the jump of the width of the forbidden ΔT at the phase transition of SbSI in the pressure range from 1 to 1500 kg/cm^2. Figure 2 shows the pressure dependences of the jump of the forbidden band width ΔE_g in electron volts, of the temperature interval of phase coexistence in $^\circ$C, and also of the ratio $\Delta T/\Delta E_g$ in relative units. It is seen from these data that $\Delta T/\Delta E_g$ remains practically unchanged with pressure, i.e., in accordance with [4], a linear relation exists between ΔT and ΔE_g, the proportionality coefficient being independent of the pressure.

Thus, both the vanishing of the interphase boundaries in SbSI near the triple point and the vanishing of the jump of the width of the forbidden band near this point serve as additional confirmation of the fact that the line of first-order phase transitions of SbSI goes over to the line of the second-order phase transitions at $T = -40^\circ$ C and $P = 1500$ kg/cm^2.

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