proportional to H was used to deflect the beam of a S1-16 electron oscillograph. By increasing the sensitivity of the oscillograph X channel and simultaneously applying an initial deflection to it, it was possible to examine individual sectors of the field pattern on the screen at scales up to 300 Oe/cm.

The MnF_2 specimen, oriented by x-ray methods to an accuracy of 2°, was mounted in the "finger" of a metal cryostat lying within the solenoid and cooled to the boiling point of liquid helium. When the strength of the external magnetic field reached the value H_c, there was a rapid inversion of the magnetic sublattice of the specimen in the plane perpendicular to the field. At this point there was an abrupt jump in the crystal magnetization [2], and the differential susceptibility $\chi_d = dM/dH$ attained a sharp maximum. Changes in the magnetization of the specimen were recorded by the induction method [3]. In the induction coil [(2), Fig. 1] surrounding the specimen 1 a sharp emf splash arises, proportional to χ_d and reaching a maximum value of about 2 V. This emf was fed to the Y channel of the oscillograph. This results in a sharp blip appearing on the extended field scale, corresponding to inversion of the sublattice (Fig. 2, first splash).

The width of this splash determines the accuracy in finding H_c, and is extremely critical with regard to the orientation of the external field relative to the axis of ordering. The solenoid was secured with micrometer screws, which make it possible to tilt the solenoid to adjust the field direction. The correctness of alignment of the field along the specimen axis was judged from the half-width and amplitude of the differential susceptibility splash. The field could thus be lined up to an accuracy of not less than 5 min of arc.

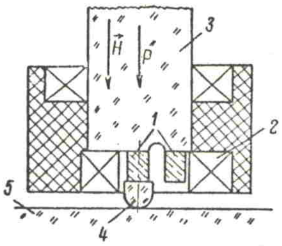

Fig. 1. Apparatus for exerting uniaxial pressure on a specimen.

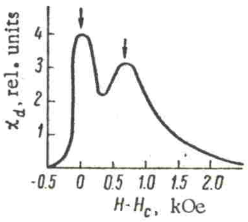

Fig. 2. Differential susceptibility of free (p = 0) and deformed (p = 2.5 katm) MnF_2 specimens, plotted against magnetic field strength close to $H = H_c$. T = 4.2°K.

2. METHOD OF CREATING UNIAXIAL PRESSURE

The method of imposing uniaxial pressure on the specimen is clear from Fig. 1. A reliable relative reading of the shift H_c under pressure was obtained by simultaneously observing signals on the oscillograph screen from deformed and free specimens. The orientations of these specimens could not differ more than 5-10'. The required coaxiality was achieved in the following way. On the quartz rod 3 transmitting the external pressure one wide specimen was glued and then cut into two parts (Fig. 1). On one part was glued a quartz hemisphere 4, resting on a quartz bearing surface 5. The other part of the specimen was left free. Fused quartz was chosen as the construction material because of its elastic properties and its coefficient of thermal expansion, close to the corresponding value for MnF_2 in the basal plane. This meant that nonuniform stresses in the specimen could be avoided during cooling. Pressure was transmitted to the quartz rod and the specimen through an argentan tube, loaded outside the cryostat with weights up to 30 kg. Specimens were held at pressures up to 3 katm without breakdown. The hermetic seal where the tube emerged from the cryostat had a dry frictional threshold not greater than 0.2 kg. The cross-sectional dimensions of the specimen were found using a traveling microscope, to an accuracy of ±5%.

3. THE TRANSITION WIDTH

If we consider the inversion of a magnetic sublattice as a phase transition of the first kind, then as the magnetic field gets closer in direction to the axis of ordering the differential suceptibility χ_d at $H = H_c$ must increase, attaining an infinite value when the directions coincide exactly ($\vartheta = 0$). It has been noted experimentally that χ_d reaches a definite maximum, the value of which falls by a half when the magnetic field moves off the axis by $\vartheta \sim 20'$. The high uniformity of the magnetic field in the position of the specimen rules out a trivial explanation of the finite transition width. (The minimum width, reckoned as the magnetic field region within which χ_d exceeds half its maximum value, is