cluding 50 cm^{-3} slow ones (with velocity less than 500 cm/sec). Thus, under the most favorable assumptions, it is possible to accumulate up to 5×10^7 slow neutrons in a cavity 1 m^3 in volume.

By placing a graphite partition over the opening that joins the cavity with the liquid helium it is possible to remove the cavity with slow neutrons from the reactor and make the measurements at a small background.

It may prove advantageous to use a palliative variant without helium, by cooling the neutron say to 70°K and accumulating up to 10^5 neutrons. We note that the index of refraction of the moderator should be less than the index of refraction of the cavity material, or else the moderator will not admit necessary neutrons in from the vacuum, and consequently will not let any out. An experi- of this type is quite difficult, but it seems that it can give the experimentators a valuable method of investigating the interaction of slow neutrons with substances introduced into the cavity. By introducing an (n, γ) absorber of neutrons into the cavity, it is easy to measure the number of neutrons left intact at the instant of observation.

We note that the neutrons in the cavity can be effectively heated to a speed above critical by mechanical displacement of the graphite surfaces at a speed of several meters per second.

The theory of the coefficient of refraction and the total internal reflection of neutrons is well known; we note only that it remains valid also at those small energies, at which the absorption cross section, following the 1/v law, becomes equal to or greater than the scattering cross section. It is easy to verify that the imaginary part of the pseudo-potential, the part describing the absorption, is small compared with the real part, which describes the scattering. Their ratio is equal to $\sqrt{\pi\sigma_s}/\lambda_1$, where λ_1 is the wavelength of the neutron for which $\sigma_s = \sigma_a$. Consequently, in the case of total internal reflection, absorption does not change the exponential law of damping of the wave function of the neutron in the medium.

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PIEZOMAGNETISM IN THE ANTIFERROMAGNETIC FLUORIDES OF COBALT AND MANGANESE

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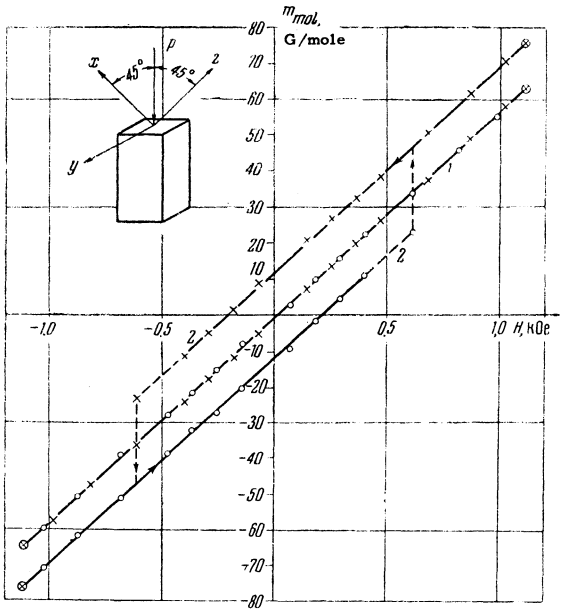
THE magnetic symmetry of some antiferromagnetic crystals permits the existence of a piezomagnetic effect,[1,2] i.e., the appearance of a spontaneous moment on applying pressure. For a group of transition element fluorides in which the antiferromagnetic vector is directed along the four-fold axis (z) of the tetragonal cell,[4] Dzyaloshinskiĭ[3] has shown that, on applying a shear stress σ_{xz}, a ferromagnetic moment $m_y = \lambda\sigma_{xz}$ should be observed. No piezomagnetic effect has been experimentally observed to date.

To detect piezomagnetism we used a specially constructed magnetic torsion balance, in which a press containing the specimen was suspended on vertical wires. Following a proposal made by P. L. Kapitza, the press was controlled with the aid of evacuated sealed bellows. When the pressure of helium gas in the space surrounding the press was reduced, the compressed bellows tried to expand and by way of a lever applied a magnified pressure to the specimen. For a specimen of 1 mm^2 cross section, the maximum pressure was ~ 500 kg/cm^2.

Single crystals of CoF_2 and MnF_2 were studied, out of which parallelipipeds were sawed—the crystallographic axes being disposed as shown in the figure. On applying a pressure, p, to such a specimen, shear stresses $\sigma_{xz} = p/2$ arise in it. The specimen was situated in an inhomogeneous magnetic field directed along the y axis, and the magnetic moment m_y was measured for several values of the field. The measurements were made at liquid hydrogen temperature (20.4°K), where the antiferromagnetic ordering of the fluorides considered is almost at saturation. The relative accuracy of the measurements was $\pm 0.3\%$; the error in the absolute values of the moment could amount to 10%.

The results of the measurements obtained on the CoF_2 specimen are given in the figure, where the dependence of molar magnetic moment on field is shown. With no pressure (line 1) we have m =



The dependence of molar magnetic moment on the size of the applied field: 1 – without pressure, 2 – pressure on specimen ~ 500 kg/cm²; o – values obtained while changing the field from – 1100 oersteds to +1100 oersteds × – while changing the field in the opposite direction.

$\chi_\perp$; thus, in agreement with the data of previous studies,[5,6] the crystal does not possess a spontaneous moment* and is in a purely antiferromagnetic state. On applying a pressure of ~ 500 kg/cm² (curve 2), the paramagnetic moment remains unchanged, but a spontaneous piezomagnetic moment is added to it, the magnitude of which, m_0 ~ 10 G/mole, does not depend on field. In weak fields (up to 500 oersteds) the direction of the piezomagnetic moment remains unchanged. In large fields of opposite direction to the spontaneous moment, the magnetization of the specimen reverses. The process of magnetization reversal is comparatively slow — in a field of 1100 oersteds the equilibrium values are attained in 15 — 20 minutes.

A piezomagnetic effect was also observed in the MnF_2 specimen. However, its magnitude in MnF_2 is approximately 100 times smaller than in CoF_2.

A fuller description of the experimental details, the results, and their analysis, will be published after completing a study of specimens with other orientations.

In conclusion the author expresses his deep gratitude to Acad. P. L. Kapitza for constant interest in the work. The author is very grateful to N. N. Mikhaĭlov and O. S. Zaĭtsev for preparing the single crystals of CoF_2 and MnF_2. He also cordially thanks I. E. Dzyaloshinskiĭ for useful discussion.

*The small downward displacement of the line (approximately 1 G/mole) is in all probability associated with plastic deformations of the crystal.

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DETERMINATION OF THE CAPTURE FREQUENCY OF SLOW MESONS BY LIGHT AND HEAVY NUCLEI IN PHOTOEMULSIONS

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In many uses of photoemulsions it is necessary to determine how much of the interaction is with the light nuclei (C, N, O) and how much is with the heavy ones (Ag, Br). The presently known separation methods (see, for example, references 1 and 2) are based on the use of special emulsions, and can therefore not always be used. We describe below a simple separation method, free of this shortcoming.

In order to be specific, we discuss only nuclear capture of stopped negative pions. If an Auger electron was produced when the negative pion was stopped, the capture was by the heavy nucleus of the emulsion.[1,3-5] If the σ_π star produced after stopping contains a particle with a range $\leq 50\,\mu$ (so-called sub-barrier particle) the corresponding capture must be attributed to a light nucleus.[1,4,6*]