In [10] it was found for a parabolic band that

$$n_{\parallel} - n_{\perp} = \frac{2\pi Ne^2}{m^* \omega^2 n_0} \frac{3\delta}{5-\delta}; \; \delta = \frac{1}{\langle\epsilon\rangle} \left\langle \frac{f_2(\epsilon)}{f_0(\epsilon)} \epsilon \right\rangle,$$

where f_0 and f_2 are the first and third terms in the expansion of the distribution function in Legendre polynomials. Using the values of $f_2(\varepsilon)$ and $f_0(\varepsilon)$ determined experimentally for hot holes in p-Ge, we can find that δ is equal to 0.4, 0.48, and 0.5 for v_{dr}^2/v_r^2 equal to 0.18, 0.44, and 0.5, respectively. Assuming that the same ratio of δ and v_{dr}^2/v_r^2 is maintained for the electrons in n-InSb with $N = 6.5 \times 10^{14}$ cm^{-3}, we can calculate $n_{\parallel} - n_{\perp}$ in accordance with [10]. For $F_0 > 140$ V/cm, the value of $n_{\parallel} - n_{\perp}$ is 6 - 7 times larger than that obtained by experiment.

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RELAXATION PHENOMENA IN FERRITES OF THE SYSTEM $NiFe_{2-x}Cr_xO_4$

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In the investigation of hyperfine interactions in ferrites of the $NiFe_{2-x}Cr_xO_4$ system [1, 2], we observed violations of the equidistant distribution of the components of the Mossbauer line of the Fe^{57}. These violations were manifest in the fact that the temperature dependence of the effective magnetic field, determined from the distance between the external and internal components of the spectrum, turned out to be different. Figures 1 and 2 (the spectra obtained with samples with x = 1.2 and x = 1.4 were identical) show the results of the reduction of the Mossbauer spectra for the compositions x = 1.2 and x = 1.4. The spectra were reduced by least squares with a computer (using a Lorentz approximation for the line shape)[1]. We took into account the fact that the Fe^{3+} ions occupy predominantly tetrahedral sites (A sites) in the crystal lattice [1, 2].

Such an ambiguity in the determination of the values of the magnetic field (it is seen in Fig. 2 at temperatures starting with $T/T_c \approx 0.7$) can be

[1] The program for reducing the Mossbauer spectrum with the computer was graciously supplied by Yu.M. Ostanevich (JINR).

naturally attributed to relaxation of the electron spin of the iron ion [3, 4]. Within the framework of the proposed interpretation, this result corresponds to relatively large values of the spin relaxation time. At somewhat larger values of the effective field for the outermost components are then the consequence of the fact that the frequency of the hyperfine structure for the nuclear transitions $-3/2 \rightarrow 1/2$ and $3/2 \rightarrow 1/2$ is larger than for the others.

It is obvious that a certain inhomogeneity of the sample can also, in principle, influence the form of the spectrum. In this case, however, this influence on the position of the components of the Mossbauer line (and also on their broadening) turns out to be not so large. The latter circumstance was ascertained by us as a result of estimates of the corresponding contributions (assuming that the temperature dependence of the effective field is described by a Brillouin function, and that the inhomogeneity of the composition of the investigated ferrites has a normal Gaussian distribution).

The results are of interest from the point of view of the question of the character of the correlation between the effective field and the magnetization of its "own" sublattice. We see that in our case there is no unique correlation between these quantities. One can only state with assurance that the $H_{eff}(T)$ curve for the internal components of the spectrum corresponds to a greater degree to the temperature variation of the ordering parameters of the ferrite sublattice.

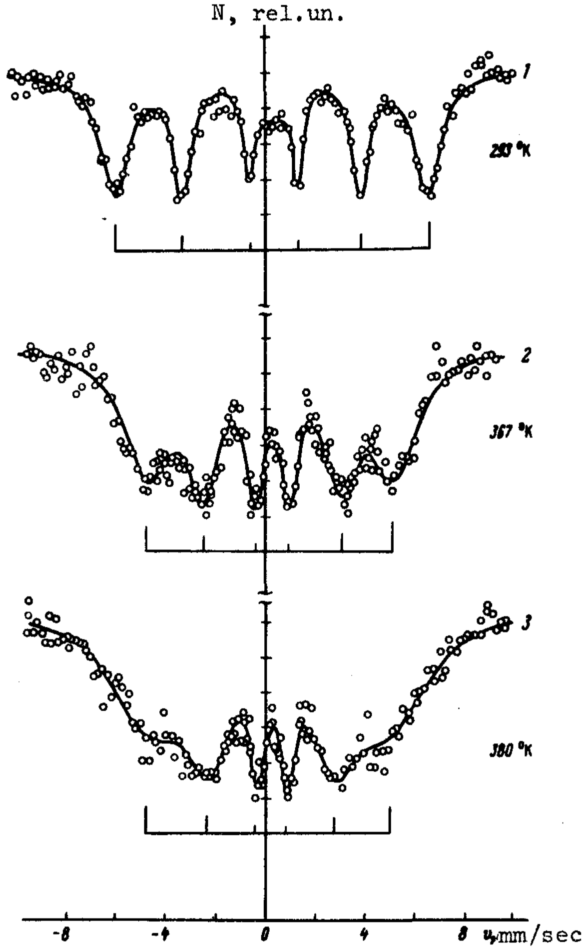
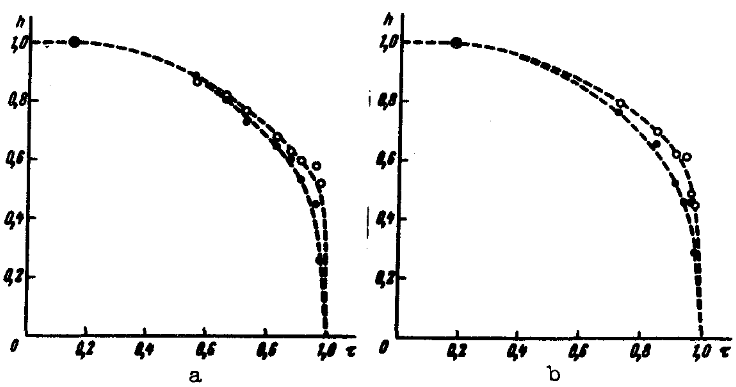


Fig. 1. Typical Mossbauer spectra of the nuclei Fe^{57} in the ferrite $NiFe_{0.6}Cr_{1.4}O_4$ at different temperatures: 1 - 293°K, 2 - 267°K, 3 - 380°K (Co^{57} source in stainless steel). The curve on the figure and the positions of the components were obtained with a computer.

Fig. 2. Temperature dependence of the effective field in relative coordinates: a - NiFe $NiFe_{0.8}Cr_{1.2}O_4$ (T_c = 521°K, H_{eff} = 512 kOe at 77°K), b - $NiFe_{0.6}Cr_{1.4}O_4$ (T_c = 403°K, H_{eff} = 487 kOe at 77°K). o - for $\pm 3/2 \rightarrow \pm 1/2$, ● - for $\pm 1/2 \rightarrow \mp 1/2$.



It is important to ascertain the causes of the noticeable increase of the spin relaxation time in systems with large exchange interactions (which include the ferrites investigated by us).

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FORMATION OF AN EXCITON DIELECTRIC PHASE IN A MAGNETIC FIELD IN A METAL-SEMICONDUCTOR TRANSITION

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1. In the investigation of pressure-induced transitions from the metallic to the superconducting state in the alloys $Bi_{1-x}Sb_x$ ($x < 0.065$) in a magnetic field, it was observed that the exciton dielectric (ED) phase, predicted in 1968 by Fenton [1] on the basis of the work of Yafet, Keyes, and Adams [2], is produced. Insofar as we know, no stationary ED phase has been observed to date.

The measurements were carried out at a hydrostatic pressure p up to 20 kbar, in magnetic fields H up to 65 kOe, at temperatures 1.9 - 4.2°K.

2. As is well known, Mott excitons [3] can be produced in transitions from the metallic to the superconducting state only at temperatures lower than the exciton binding energy E_B, under the condition $a_B^* < r_D$, where a_B^* is the effective Bohr radius of the exciton and r_D is the Debye screening radius [4 - 6]. In the absence of a magnetic field, this inequality is satisfied for the alloys $Bi_{1-x}Sb_x$ at carrier densities below $\sim 10^{11}$ cm^{-3}. Since there are no samples of such purity at the present time, the transition from a metallic to the superconducting state (as well as the inverse transitions) at H = 0 [7] are phase transitions of order 2.5 after I.M. Lifshitz.

In a magnetic field, as shown in [1, 8], the decrease of a_B^* and the increase of E_B, and also the one-dimensionalization of the electron gas, make possible the formation of an ED phase at carrier densities $\sim 10^{15}$ cm^{-3}, corresponding to $Bi_{1-x}Sb_x$ alloys with realistic purity. The formation of this phase is characterized by the occurrence of an energy gap Δ, which increases in the magnetic field, and whose magnitude is determined by the binding energy of the excitons.

Since the magnetic field shifts the band boundaries, we chose for a reliable detection of the ED phase such an orientation of H, at which the gap G in the semiconducting state decreases in the field (the overlap -G in the metallic state increases accordingly).

3. The measurements were performed with samples of $Bi_{0.9725}Sb_{0.0275}$ and $Bi_{0.954}Sb_{0.046}$ with donor densities 2×10^{15} and $\sim 3 \times 10^{14}$ cm^{-3}, respectively. The impurity density and type was determined by measuring the components of the galvanomagnetic tensor in weak fields, in the region where the transition into