superconducting. In addition, as already noted by us earlier [9], the study of the superconductivity has made it possible to detect the presence of a new modification, Te IV, which occurs at ~80 kbar.

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POLARIZATION OF Li^8 FRAGMENTS IN NUCLEAR REACTIONS PRODUCED BY SLOW π^- MESONS

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Splitting (one per ~300 stopped π^- mesons) accompanied by formation of Li^8 fragments was observed following capture of slow π^- mesons by emulsion nuclei. The Li^8 tracks in the emulsion are reliably identified by the "lithium hammers" produced by β decay of Li^8

$$Li^8 \xrightarrow{\beta^-} Be^8 \to 2\alpha .$$

With the aid of NIKFI-R emulsions irradiated with slow π^- mesons, we measured the angular distribution of the electrons of the β decay of the Li^8 fragments relative to the direction of its momentum (by the direction of the Li^8 fragment momentum is means the direction of the start of its track). The result of measurements for 957 cases is shown in Fig. 1 as a function of the excitation energy of the Be^8 nucleus. The parameter η characterizing the distribution of the electrons is taken to be the ratio

$$\eta = \frac{N_f - N_b}{N_f + N_b} ,$$

where N_f and N_b are the numbers of the electrons emitted in the

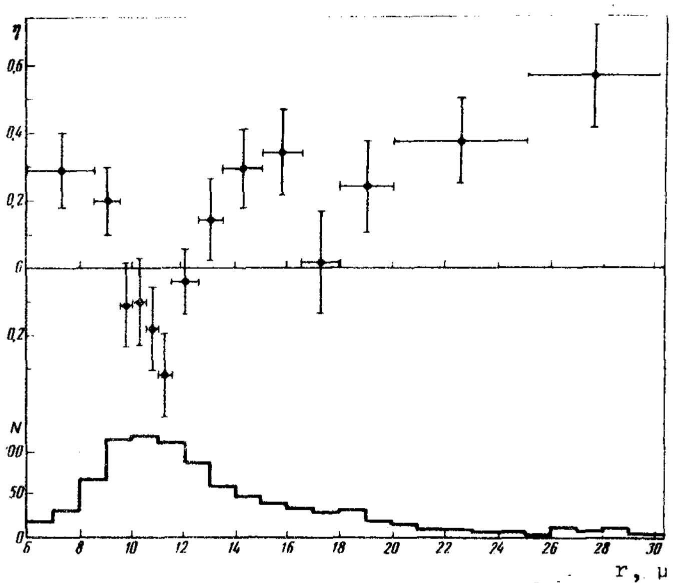

Fig. 1. Asymmetry parameter η of the emission of the electrons from the β decay of Li^8 vs. the summary length, R, of the tracks of the two α particles of the decay of Be^8. The histogram shows the distribution of the reaction yield N as a function of R.

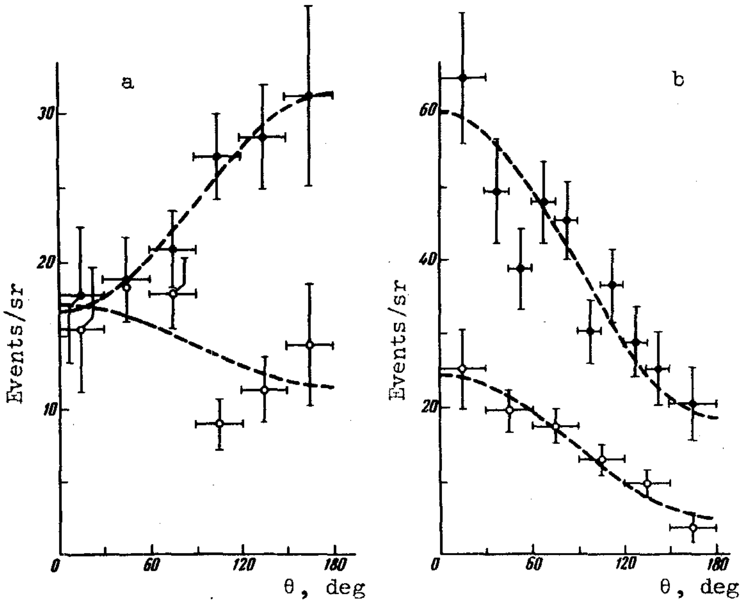

Fig. 2. Angular distribution of electrons for different intervals of the Be^8 excitation energy: a - $R \leq 9.5$ μ (light circles) and $9.5 < R \leq 12$ μ (dark circles), b - $R > 12$ μ (dark circles) and $R > 18$ μ (light circles). The dashed curves are approximations by means of the expression $f(\theta) \sim 1 + a \cos \theta$.

forward and backward hemispheres, respectively, relative to the direction of the momentum of Li^8. The histogram shows the distribution of the reaction yield as a function of R. We see from the presented data that the observed values of the parameter η deviate greatly from the value $\eta = 0$ corresponding to symmetrical emission of electrons into the forward and backward hemispheres relative to the direction of the Li^8 momentum. For a quantitative estimate of the value of the observed deviation from symmetry we calculated the values of χ^2 and the corresponding probabilities for the differences $\Delta N = N_f - N_b$ under the assumption that ΔN has a normal random distribution with a zero mean value and with a variance $\sigma^2 = N_f + N_b$. For 14 intervals of R, corresponding to the points of the plot in Fig. 1, we obtained $\chi^2 = \Sigma \Delta N_i^2/\sigma_i^2 = 58$. The probability of the value $\chi^2 \geq 58$ at 14 degrees of freedom is $\omega = 3 \times 10^{-7}$.

On the basis of the plot of Fig. 1 we can separate three intervals of R, in which qualitatively different angular distributions are observed: $R \leq 9.5$ μ ($\eta > 0.177$ event), $9.5 < R \leq 12$ μ ($\eta < 0.299$ event), and $R > 12$ μ ($\eta > 0.481$ event). The excitation energy of Be^8 for these intervals are, respectively, $E^* \leq 2.7$ MeV, $2.7 < E^* \leq 3.5$ MeV, and $E^* > 3.5$ MeV (henceforth referred to as the intervals I, II, and III). Figure 2 shows the angular distributions of the electron relative to the direction of the momentum of Li^8 for the three designated regions of excitation of Be^8, and also a fourth distribution for the region $R > 18$ μ (this interval corresponds to the region of values of R beyond the second minimum of the distribution for η, which possibly exists at $R \sim 17$ μ; $E^* > 5.2$ MeV, 185 events). All the distributions were approximated by the expression $f(\theta) \sim 1 + a \cos \theta$. The values of a, obtained by least squares, turned out to be 0.20 ± 0.15, -0.30 ± 0.11, and 0.53 ± 0.10 for the intervals I, II, and III, respectively, and $a = 0.67 \pm 0.14$ for the region $R > 18$ μ.

The asymmetry of the emission of the β-decay electrons relative to the direction of the momentum of the Li^8 fragment denotes that the spin of the Li^8 fragment has a certain preferred orientation (we know presently of no factors, other than the polarization, capable of causing asymmetry of electron emission in β decay of nuclei). But in reactions caused by pions the formation of the Li^8 fragments in a state containing a correlation of the SP type is strictly forbidden by the law of conservation of spatial parity in strong interactions. The experimental data thus contradict this law. As shown by the foregoing values of χ^2 and of the corresponding probabilities, the deviations from symmetry is too large to be attributed to statistical fluctuations. This is all the more obvious if the monotonic character of most obtained angular distributions is taken into account. This character is particularly pronounced at $R > 12\ \mu$ and $R > 18\ \mu$. The nuclear emulsion method used in the experiment is quite simple, thoroughly investigated, and verified in many other measurements, and in this concrete case we see likewise no flaws in the experimental procedure, capable of imitating the registered asymmetry of the angular distribution of the electrons.

SLOWING DOWN OF DISLOCATIONS IN FERROMAGNETS

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Dislocations moving in ferromagnetic materials should be slowed down by the interaction between the deformations accompanying them with the spin waves. Some of the losses are connected with the scattering of the "thermal" spin waves and can be described in the same manner as the slowing down of phonons. More interesting, in our opinion, is another loss mechanism, brought about by generation of spin waves by the moving dislocation. The generation condition, as usual, is that the dislocation be faster than the phase velocity V_s of the spin wave. Owing to this condition, this contribution to the deceleration force should have a velocity threshold. The threshold velocity V_s can be altered by means of an external magnetic field H_0, for it is known [1] that $V_s \sim \beta + (H_0/M_0)$, where β is the anisotropy constant and M_0 is the density of the magnetic moment. Therefore when $H_0 >> M_0$ the value of V_s increases to such an extent that the process of spin-wave generation is interrupted and the corresponding part of the dislocation deceleration vanishes. This circumstance can be used for an experimental observation of the deceleration, since a sudden disappearance of part of the deceleration forces can become manifest in the form of a jump on the stress-strain diagram of the sample.

The purpose of the present investigation was to analyze the aforementioned threshold mechanism of deceleration in ferromagnets. The calculation is carried out in the macroscopic approximation and consists of determining the force exerted on the dislocation by the magnetoelastic coupling. To this end, we use the law of conservation of the energy of the ferromagnet. The energy density W includes elastic, magnetoelastic, and electromagnetic components. They have the usual form (cf., e.g., [1, 2]), but allowance for the dislocations requires, as is well known, the replacement of the deformation tensor $\partial u_k/\partial x_j$ by the elastic-distortion tensor w_{ik}, which is not expressed in terms of derivatives of the vector $\vec{u}$ (of the geometric displacement of the medium) with respect to the coordinates, owing to the presence of plastic deformation [3]. Allowance for the plastic deformation makes it possible to connect w_{ij} with the velocity of the medium $\vec{v} = \dot{\vec{u}}$ [3]:

$$\frac{\partial w_{ij}}{\partial t} = \frac{\partial v_j}{\partial x_i} + J_{ij}\,. \qquad (1)$$

Here J_{ij} is the dislocation flux density given, in the case of a single dislocation characterized by a tangential vector $\vec{q}$, a Burgers vector $\vec{b}$, and a velocity $\vec{V}$, by