2. The magnetic moment of the proton is equal to double the value of the nuclear magneton.

3. The ratio of the charge form factor of the proton to its magnetic form factor (with both form factors normalized to unity at $q^2 = 0$) is given by

$$G_{Ep} : G_{Mp} = 1 - q^2 \tag{4}$$

It follows from (4) that the charge form factor of the proton decreases somewhat more rapidly than the magnetic one, and goes through zero when $q^2 = 1$ ($q^2 \sim 4$ (BeV/c)^2).

The experimental data on the form factor of the proton [2] do not contradict relation (4).

4. The ratio of the charge form factor of the neutron to its magnetic form factor is small for small q^2, and increases slowly with increasing q^2. When $q^2 = 1$ the form factors become comparable in absolute magnitude.

5. The ratio of the magnetic form factors of the proton and of the neutron is independent of q^2.

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ON THE POSSIBILITY OF AN OPTICAL SHIFT OF THE MOSSBAUER-SPECTRUM LINES

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We propose to use the Mossbauer spectra (MS) of γ-resonance nuclear absorption to investigate the excited states of the electron shell and to determine certain kinetic parameters of the system by measuring the optical shift - the change induced by sufficiently strong light in the spectrum of a source or an absorber of γ quanta in the optical excitation band. To observe the optical shift it is necessary (a) that the lifetime of the optically-excited state be much longer than the lifetime of the excited state of the nucleus, and (b) that the concentration of the Mossbauer centers affected by the optical excitation be comparable or larger than the concentration of the centers not excited by the light. It can be shown that these conditions are realized in a very large number of real systems, and that different variants are possible in semiconductors with optical impurities. Of particular interest (for example, for the determination of the parameters of laser systems) are cases in which optical population inversion can be realized.

The displacement of the MS lines in the optical shift is determined by the same formula as the chemical shift, and contains the characteristics of the optically excited state of the system (see [1]). Additional important information can be obtained from the dependence of the intensity ratio of the shifted and fundamental MS lines (which is equal to the ratio of the populations of the excited and the ground state electronic levels) on the illumination power. Knowing this dependence, we can determine on the basis of the kinetic equation, for example, the probability of nonradiative transition between the electronic states.

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OBSERVATION OF DYNAMIC INTERMEDIATE STATE OF SUPERCONDUCTORS WITH THE AID OF MICROCONTACTS

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In 1957 Gorter [1] proposed a model for the intermediate state of a superconductor in which current flows from an external source. According to this model, alternating layers of superconducting and normal phases should arrange themselves in the sample in the direction of the current and move continuously in the perpendicular direction. This interesting idea, however, received no experimental confirmation so far. A. I. Shal'nikov [2] investigated the structure of the intermediate state of a cylindrical sample in a transverse external field, with direct current flowing along its axis, and observed that the layers are immobile and are perpendicular to the current direction, in accordance with the model proposed earlier by F. London [3]. Observations by other authors (see [4,5]) also lead to the conclusion that the current induced when the sample goes over into the intermediate state orients the layers in a perpendicular direction. The experiments described below show, however, that Gorter's model is nonetheless realized in some cases.

Figure 1 shows the diagram of an experiment in which we succeeded in observing continuous motion of superconducting and normal layers under stationary external conditions. A single-crystal disc of thickness L = 0.4 mm and of 18 mm diameter, made of tin containing about 10^{-4}% impurities, was placed at $T < T_c$ in a magnetic field H oriented at an angle β to the surface of the disc, and went over into the intermediate state. The direct current I, whose magnetic field at the sample was much smaller than H, was made to flow through the sample in the direction of the projection of H on the sample surface.

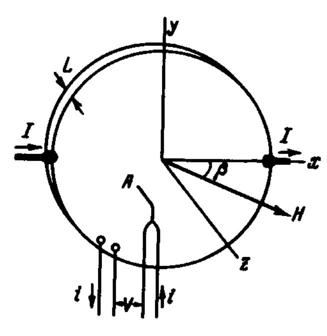

Fig. 1

According to [6], the structure of the intermediate state, produced in the plate under the influence of the inclined field, has in the case of sufficiently small β the form of layers which are elongated along the projection of the field on the surface