Magnetic field?... It's very simple!

Protoelectrons - time to introduce yourself

A magnetic field is known to be related to an electric current. But no one knows what this concept actually means, what the nature of this relationship has, what physical phenomenon is behind these words. The physical mechanism by which a magnetic field arises and remains in and around the material structure of the magnet is unknown. The mechanism of the linkage between the magnetic field and the electric current is not known. And what is known about these relationships is a substitute for physical knowledge in which the physical description is replaced by a mathematical description. In this description, the main term is a vector quantity called magnetic induction B. There is therefore a mathematical description that shows the quantitative relationship between the various field and current parameters. However, there is no logical description of the course of physical changes in matter related to the flow of electric current and the existence of a magnetic field.

Currently, knowledge of the magnetic field has already reached a much higher level than what is presented in today's physics textbooks. But the authors have yet to write new textbooks. So I have the opportunity to surprise my readers. I have the opportunity not only to show that the magnetic field is a simple physical phenomenon, to show what it is, to show its relationship with the electric current, but I also have the opportunity to be the first physicist (admittedly, only self-taught) to present this new knowledge. I must add here that it will be part of a larger whole which is called the Great Unification.

In order to understand the existing connections between electric current and magnetism, it is necessary to introduce a new concept - protoelectron. A protoelectron is a concept - a word the use of which is intended to facilitate and simplify the description. Because instead of using many words many times in many places, for example, in the form of - a centrally symmetrical field of a fundamental nature, it is more convenient to use one word - protoelectron.

A protoelectron is what exists before an electron is formed. Protoelectrons are centrally symmetrical fields (c.s. fields) that exist both where there is matter in the form of atoms and in a physical vacuum. Protoelectrons are particles of matter that manifest their existence in physical experiences. They will play a key role in the further description of the phenomena.

Undoubtedly, you know an experience in which two parallel guides are placed close to each other. They are able to move freely in relation to each other. When the electric current in both conductors flows in one direction - the conductors are attracted to each other. And when the current in both conductors flows in opposite directions - the conductors repel each other.

Such behavior of conductors results from the operation of a mechanism that is identical in all magnetic interactions, and here it appears in an elementary form.

This experiment can be modified and performed as follows. Place the two conductors horizontally, one slightly above the other, perpendicular to each other. The guide placed higher should be able to rotate around a vertical axis. The lower guide is north-south and the upper guide is east-west. When in one conductor an electric current flows in the "north" direction, and in the other "west", the second conductor starts to rotate "clockwise", i.e. it tends that the directions of the currents in both conductors coincide with each other - so that the current the electric in both wires was flowing "north".

Does this remind you of anything? ... Just to remind you, you can imagine that the upper conductor (from the previous experience) is the lower part of the frame circuit in which the electric current flows. Thus, the entire frame is positioned on a vertical plane which is in the "east-west" direction and is rotatable about a vertical axis. In this experiment, when electric current flows in both conductors, we are already dealing with an elementary electromagnet that is located above the conductor carrying the electric current.

At this point, let's refer to the concept of the magnetic field, let's use the concept of the magnetic induction vector and the right-hand rule. By applying the right-hand rule, you can see that the induction vector, which can be placed in the center of the frame at the beginning of the experiment, points "north", and when the electric current begins to flow, the frame gradually tilts to the right. So the frame with the current behaves in the same way as the magnetic needle, if it was placed over the conductor with the current. Because in such a situation, when the magnetic needle is parallel to the conductor (at the beginning of the experiment), and the current in the conductor flows towards "north", the needle deviates to the right.

There is an interesting issue related to the magnetic induction vector and the behavior of the magnetic needle that, in fact, may be misleading. But when the physical mechanism of the phenomena associated with what we call the magnetic field is known, such an error is no longer possible.

Well, the direction in which the magnetic needle is deflected depends on whether the needle is above or below the conductor carrying the electric current. Because when the needle is above the guide, it swings to the right, while when placed under the guide, it swings to the left. The behavior of the needle suggests the existence of magnetic field lines around the conductor with an appropriately directed magnetic induction vector. Because she is acting as if she is trying to position herself along these lines of the field.

The direction of the deflection of the conductor when it is (at the beginning of the experiment) perpendicular to the second conductor and when electric current flows in both conductors, does not depend on whether it is located above or below the second conductor. In both cases, the conductor tilts in the same direction, because the directions of current flow in the conductors have not changed.

The described behavior of a perpendicular conductor (with current) and a magnetic needle (set in parallel) near a conductor with an electric current is a hint about the stability of the magnet's structure and the nature of this structure. A hint is also what happens in the conductor when an electric current flows in it, and everything that happens around it.And in the conductor we have a situation where there is a stable structure made of atoms and there is a strong stream of flowing electrons. The atoms retain their stable structure thanks to their potential shells. In their structure, atoms condense matter which consists of protoelectrons. And this compaction follows a similar physical law as the compaction of the atmosphere around a planet. Densified protoelectrons create separate densities in the form of electrons in atoms. The formation of electrons is favored, on the one hand, by the densification of the material from which they are made and the existence of their potential shells in these building components, i.e. in protoelectrons. But potential proton shells and, in general, potential atom shells also play an important role. These shells separate the protoelectron matter from each other into certain portions, and also create spherical regions in atoms in which the protoelectron matter circulates, as if in an orbit.

In the conductor structure, the atoms are in some sense in contact with each other through potential shells that keep them stable. Other potential shells of these atoms, having larger and smaller diameters, interpenetrate and, in a sense, regulate the movement of free electrons in the structure. Electrons that flow (fly) in the conductor and physically make up the electric current, flow in the streams avoiding the greatest densities of protoelectrons that exist in and near atomic nuclei. Their movement in the conductor sets paths along which new electrons travel.

The electron paths in the conductor change their configuration as electrons move. But it is of little importance for the movement of electrons in the conductor, as long as the stable structure of the conductor as a whole is preserved.

The flow of electrons in the conductor (ignoring the reason for its existence for the time being) is in fact the core of the whole phenomenon. Because the difference between what happens in a conductor under the influence of an applied voltage, and what happens outside it is only quantitative. There is the highest flow rate of protoelectrons in the conductor, because there they are most concentrated in the form of electrons. There is a smaller flow rate of protoelectrons around the conductor, because their concentration is lower there. Thus, as we move away from the conductor, the flow rate of the protoelectrons parallel to the conductor becomes smaller.

Increase in the mass of magnets - a new phenomenon

The flow of electric current in a conductor is related to the phenomenon of protoelectron compaction in and around the conductor. Compaction occurs only when the electric voltage applied to the ends of the conductor increases and the velocity of the electrons flowing in the conductor (protoelectrons) increases. The increase in the velocity of the electron flux in the conductor results in an increase in the velocity of the protoelectrons everywhere around the conductor, and the increased velocity results in the mutual attraction of protoelectron streams flowing parallel to each other. And it is done in a similar way to the attraction of two parallel conductors with a current when the current flows in the same direction. In this way, protoelectrons located far from the conductor get closer and closer to it, and overall the intensity of the magnetic field increases. When the current in the conductor decreases, the phenomenon takes place in the opposite direction, i.e. the speed of the protoelectrons decreases and they move away from the conductor.

The change in the density of protoelectrons flowing around a conductor with a current, which occurs along with a change in the intensity of the electric current, is the basic phenomenon thanks to which electromagnetic waves are created and their emission takes place. The alternating current, as it flows in the conductor, contributes to the pulsating compaction and dilution of the protoelectron environment (physical vacuum), and these changes, as ordered disturbances, travel in different directions over great distances.

Changes in the density of protoelectrons in a physical vacuum can be observed indirectly in a beautiful experiment, the video of which can be viewed at http://www.youtube.com/watch?v=43TzU0TTzjk. In the experiment, a vacuum flask is placed between two Helmholtz coils, with an electron gun inside it. From the gun, a stream of electrons is ejected, which run parallel to the planes in which both coils are located. So, using magnetic terminology, the electrons fly in a direction perpendicular to the magnetic induction vector B of the coils.

When electric current flows through the coils, the path of the electron beam curves. The curvature of the electron path in the vacuum flask into a circle and the decrease in the radius of this circle, which occurs when an increasing electric current flows through the coils, testifies to several facts. Firstly, it confirms both the existence of protoelectrons in a physical vacuum and their movement in circles that are concentric to the cylindrical surfaces passing through the turns of the coils. Secondly, the decrease in the radius of the electron path in the flask, which occurs as a result of the increase in the current intensity, confirms the existence of a greater concentration of the protoelectron medium in a physical vacuum at that time. The reduction of the electron track radius is possible due to the increased density of the protoelectron medium and the increased velocity and intensity of the protoelectron flow along concentric tracks. Because only in such conditions physical vacuum protoelectrons can influence rushing electrons in such a way that the radius of their path in the flask is reduced.

Today, the physicist will say that the decrease in the radius of the path on which the electrons travel is due to the increase in the magnetic induction B of the Helmholtz coils. Although he does not yet know the real cause of the curvature of the electron path, in a "mathematical sense" he is right. But undoubtedly, he will be more satisfied when, while giving such an answer, he knows the real mechanism of this phenomenon at the same time.

Another interesting thing is the stability of the permanent magnet's magnetic field. Because in the case of an electromagnet, this stability is ensured under the influence of the electric voltage that is applied to the ends of the coil, and as a result of the electric current flowing in the coil. And what contributes to the fact that this stability exists in the magnet?

Well, when there is a steel core in the coil of the electromagnet and an electric current flows through the coil, then in the structure of the coil's material (in copper or aluminum) there are electronic paths along

which electrons are flowing. Electronic pathways of a similar nature are formed in the structure of the steel core - and electrons travel through these pathways. The electronic paths in the core are formed from the moment the coil's electrical circuit is closed and the current begins to flow.
Logic dictates that as the current in the coil changes, the current in these paths will change in the core. And it would indeed be so ... But on condition that the core was made of a non-magnetic material or of a soft magnetic iron. Because these materials cannot fix the electronic pathways in their structure, which arise as a result of the magnetization process with an electric coil. Because when the current stops flowing in the coil, the thermal movements of the atoms in these materials immediately cancel the electronic pathways.

The situation is different with the steel core. Steel is the material whose structure is stable and preserves the electronic pathways that arise in it when an electric current flows in the coil. Turning off the current in the coil only slightly reduces the current that flows through the electron paths in the steel core.

And here is the finished magnet ... There are no windings wound in it, but a constant electric current flows nonetheless. No electrical voltage is needed to supply power here, because this role is played by the very structure of the magnet and the existing thermal movements of the structural components. The only difference between a magnet and a non-magnet is that in a magnet a lot of electrons follow ordered paths, imitating the movements of electrons in the windings of a coil that no longer exists (around it).

And most importantly ... The mass of the steel magnet is slightly greater than the mass of the same steel core when it was in the coil and the magnet was not yet. The increase in the mass of the magnet is due to the densification of the protoelectron medium in and around the magnet itself. And this, as we already know, is caused by the flowing streams of electrons in the structure of the magnet.
Whoever does not believe - let him check ...

Bogdan Szenkaryk "Pinopa"
Poland, Legnica, 2011.02.07.