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NATURAL SCIENCES AND A SCIENTIFIC LOOK AT THE UNIVERSE

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ANNOTATION
The article is devoted to natural science, physics, chemistry, biology, geography, ecology and interprets a unified scientific view of the universe. Classical Newtonian mechanics plays a special role in the description of the scientific landscape ofthe Universe, as well as in the formation of the idea of a single scientific landscape of the Universe among students of general education schools

Keywords: Universe, Newton, classical mechanics, circle, mechanics, thermodynamics, electrodynamics, optics, atomic and nuclear physics, quantum mechanics.

Аннотация
Статья посвящена естествознанию, физике, химии, биологии, географии, экологии и интерпретирует единый научный взгляд на мироздание. Классическая механика Ньютона играет особую роль в описании научного ландшафта Вселенной, а также в вопросах формирования у учащихся общеобразовательных школ представления о едином научном ландшафте Вселенной.

Ключевые слова: Вселенная, Ньютон, классическая механика, кружок, механика, термодинамика, электродинамика, оптика, атомная и ядерная физика, квантовая механика.

INTRODUCTION

In mainstream schools, in and outside the classroom, it is important to give students an understanding of the scientific landscape of the universe and show the connections between the natural sciences. Classical Newtonian mechanics plays a special role in describing the scientific landscape of the Universe. Attempts were made to explain all phenomena in nature on the basis of Newton's laws, but later it became clear that the connections between microparticles are not based on Newton's laws. Later it was found that the structure of the atom was determined, that the laws of communication between the elementary particles of a radioactive phenomenon obey the laws of quantum mechanics. Considering that biological living things also consist of chemical elements, it would be appropriate to apply the laws of physics to both biology and chemistry. Demonstration and explanation of interesting physical experiments in extracurricular activities also play a special role in the formation of a scientific picture of the world among students.

The natural sciences include physics, chemistry, biology, and geography, each of which is further subdivided into several areas. For example, in physics, mechanics, thermodynamics, electrodynamics, optics, atomic and nuclear physics, quantum mechanics, etc. Of course, the abundance of such sciences and directions testifies to the objective complexity and versatility of the world around us. In such cases, science has adopted the following approach to problems: first, analysis (analysis), then synthesis (generalization). In practice, the problem under study is divided into several small parts, that is, elements, and the connections, relationships and effects between them are studied. The components are analyzed, then the elements are reassembled and the results of the analysis are examined. Synthesis is the study of things and events in general, based on the results of analysis, if analysis is a preparatory stage of cognition in the process of research, synthesis completes it.

What is the main purpose of natural science? The whole universe is one, all its parts exist separately - not separately, but in unity. Therefore, our main goal is to study the Universe only in unity. Studying the Universe as a whole, as a whole, allows us to observe and predict its change. This science can be a science only if it can predict it.

In this regard, there are certain shortcomings in the centuries-old process of the development of natural science, for example, synthesis has a great influence on the activity of the human biosphere, and not only natural sciences, but also social sciences or social sciences, and the processes must be taken into account. It goes without saying that economic laws and processes must also be taken into account.

To substantiate the natural science concept of the Universe, let us turn to very ancient times. In 585 BC, the Greek natural philosopher Thales became famous for predicting a solar eclipse when a solar eclipse was actually observed in Greece.

The Greek scientist Pythagoras, who lived in the 6th century BC, studied the properties of a number of numbers in arithmetic, flat figures in geometry and discovered a theorem that bears his name. At this time, the physician, physiologist and philosopher Empedocles explained that the phenomenon of a solar eclipse is associated with the passage of the Moon between the Sun and the Earth. He realized that because the light is spreading so quickly, we do not feel the time of its scattering. Ancient scientists achieved some success in mathematics (Euclid, who lived in the 3rd century BC), astronomy (Ptolemy, who lived in the 2nd century BC).

In medieval Europe, science was completely subordinate to the teachings of religion. For this period, the teachings of astrology, alchemy, magic, witchcraft and other mysteries are typical. However, during this period, new scientific facts gradually accumulated, and the logic of theoretical thinking was sharpened.

Galileo and Newton made revolutionary changes in mechanics in the 16-17 centuries. Galileo showed that, according to the law of inertia, a rectilinear and uniform motion of a body is equal to a state of rest. Galileo argued that no body can change the direction and value of its speed without the action of force, and was the first to bring mechanics to the level of theoretical science.

The most fundamental laws of nature were substantiated by I. Newton in 1687 in his work "The Mathematical Principle of Natural Philosophy", in this work he substantiated his three basic laws of mechanics, hence the name of classical mechanics as Newtonian mechanics.

The laws of classical mechanics apply to large masses moving at relatively low speeds. All Newton's laws arose as a result of generalization of the facts obtained in many experiments. According to Newton's first law: if other bodies do not act on a body, it retains a state of rest or a state of rectilinear uniform motion. The state in which bodies maintain their state in the absence of external influences is called inertia, and the law itself is called the law of inertia.

If Newton's first law is fulfilled in the frame of reference, such a frame of reference is called an inertial frame of reference.

According to Newton's second law, the acceleration of a body is directly proportional to the force acting on it and inversely proportional to the mass of the body.

According to Newton's third law, two bodies interact with a force equal and opposite to each other.

As a result of the popularity of Newton's laws in physics, attempts were made to explain all phenomena in nature on the basis of these laws, but the interactions between microparticles and actions close to the speed of light did not obey Newton's mechanics.

Polish astronomer N. Copernicus explains the heliocentric theory that the Sun is at the center of the Universe in his work "On the Rotation of the Celestial Sphere" (1543), and refutes the geocentric theory that the Earth is at the center of the Universe. During this period, the Italian scientist G. Bruno proved that the Universe has no center, that it is infinite and consists of an infinite star system. The theory of N. Copernicus and the ideas of J. Bruno were confirmed by Galileo's own telescope, which could see craters and mountain ranges on the Moon, the constellations that make up the Milky Way, the moons of Jupiter and the Sun spots. The German astronomer I. Kepler discovered the laws of motion of the planets of the solar system. These discoveries confirmed the Copernican theory. As a result, these ideas began to spread rapidly among people. The Roman Church banned the works of N. Copernicus. In 1633, the Inquisition of the Roman Church held a trial against Galileo, forcing him to abandon his ideas. Galileo admitted that he was "lost" and was forced to abandon his ideas.

At the end of the seventeenth century, revolutionary changes took place in mathematics. The English scientist I. Newton and without his knowledge the German mathematician G. Leibniz gave the principles of integral and differential calculus. These studies became the basis of the science of mathematical analysis and the mathematical basis of all natural sciences. In the middle of the 17th century, R. Descartes and P. Fermi founded the science of analytic geometry with their scientific works.

In the middle of the 17th century, the ideas of the evolutionary development of natural phenomena began to penetrate into natural science. An important role in this was played by the scientific work of I. Kant, M. V. Lomonosov, P. S. Laplace, who developed hypotheses about the natural origin of the solar system. Lomonosov (1711-1765) in practice determined the law of conservation of matter, theoretically substantiated it and gave the idea of the law of conservation of motion.

The basic laws of thermodynamics were discovered by the scientific work of a large group of scientists - N. Carnot, J. R. Mayer, G. Helmholtz, R. Clausius, W. Thomson, W. Nerst and others. One of them is that the law of conservation of energy is adopted as a general scientific law. M.Faraday and D.J. Maxwell laid the foundations of the doctrine of the electromagnetic field. The cell theory of T. Schwann, M. Schleiden, J.E. Purkinje and Darwin's theory of evolution were of particular importance for the development of theoretical thinking in biology.

By the end of the 19th century, all natural sciences were in a developmental stage. After mechanics, the theoretical sciences included chemistry, thermodynamics and electricity. In 1861 A.M. Butlerov formulated the doctrine of the chemical structure of molecules, in 1869 D.M. Mendeleev discovered the periodic table of chemical elements, and in the 1970s he hypothesized that the atom is composed of very small particles. P.F. Goryapinov, who gave the theory of the structure of organisms from cells, made a great contribution to the development of biology. In physiology, I.M.Sechenov discovered higher nervous activity, conditioned reflexes discovered by I.P. Pavlov (1855-1935) were a continuation of this idea. At the beginning of the 20th century, a second revolution took place in physics, in natural science as a whole, that is, the relativistic and quantum-mechanical landscape of the world was recognized. These include the electromagnetic waves discovered by H. Hertz, X-rays, the radioactivity of M. Becquerel, the determination of the element radium by M. Sklodowska and P. Curie, the light pressure of P. Lebedev, the creation of the first theory of quantum theory by M. Planck and other discoveries. As a result of these discoveries, there has been a historical change in the physical landscape of the world. If before Maxwell a physical being was considered in the form of material points, then after Maxwell it was considered that a physical being consists of continuous fields that cannot be explained from a mechanical point of view. In the twentieth century, a new era has begun, the physical landscape of the Universe has become a fundamentally new relativistic and quantum-mechanical landscape.

The scientific view of the Universe serves as a link between the science of philosophy and the theories of the exact sciences (for example, a physical view of the Universe for the science of physics). As a result of the interaction of such sources, new theoretical principles and categories of natural science arise.

Some concepts of the scientific landscape of the Universe include the achievements of science that determine the place of man in it. In this case, the scientific picture shows not the sum of general knowledge, but a complete system of ideas about the general properties, state and laws of nature. Thus, the scientific landscape of the Universe is a synthesis of various scientific theories and their qualitative generalization, a separate form of a specific system of knowledge.

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