PHYSICS AND HISTORY OF ITS DEVELOPMENT

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Physics is a general science of nature that studies the structure, shape, properties, and general properties of matter and its interactions. Some natural sciences, such as chemistry, geology, and biology, study the special laws of the complex interaction of forms of matter in different and definite material systems. Consequently, there is a connection between physics and other natural sciences. The boundaries between them are relative and will change over time. Physics is the theoretical foundation of technology. The development of human society, the socio-economic and other conditions of historical periods play an important role in the development of physics.

Historical development of physics. The history of physics can be divided into three periods: 1) the period from antiquity to the seventeenth century; 2) The period from the 17th century to the end of the 19th century. The science of physics in this period is usually referred to as classical physics; 3) The period from the end of the XIX century to the present. Modern physics (or the newest physics) belongs to this period.

It is necessary to study various events and their causes. reflected in the works of contemporary scholars that have come down to us. From the 6th century BC to the 2nd century AD, concepts and ideas about the composition of atoms (Democritus, Epicurus, Lucretius), the geocentric system of the world (Ptolemy), electrical and magnetic phenomena (Fales), statics (Pythagoras), and laid the foundations for the development of hydrostatics (Archimedes), discovered the laws of linear distribution and return of light, and in the 4th century BC Aristotle summed up the work of past generations and contemporaries. In the ninth and sixteenth centuries, Central Asian scientists made significant contributions to the development of science, including physics. Ahmad al-Farghani's The Movement of Celestial Bodies was written in the ninth century, translated into Latin in the twelfth century, and into other European languages in the thirteenth century. He detected the refraction and refraction of light. As the founder of the theory of stereographic projection, Fergani proved that it is possible to measure certain quantities based on the ratios of the projections of the motion of space objects in the planes.

Beruni proved that the Earth revolves around its own axis with the help of his own instruments and found that the Earth's radius is about 6490 km. It covers the materiality of the world, types of motion, atomic fission, post-atomic particle interaction forces, methods for determining specific gravity, body inertia, space, atmospheric pressure, fluid hydrostatics, causes of snow, rain and hail, energy circulation, electrification of bodies, sea and The causes of the rise and fall of ocean waters, the corpuscular and wave properties of light, the speed of sound and light, the causes of the return and refraction of light, the phenomenon of dispersion, the proximity of the Earth and other planets to the Sun, and the weightlessness of space objects. Abu Nasr al-Farabi's ideas on the speed of sound, the wave nature of sound, the frequency of sound, the wavelength of sound, and the musical notes based on them, as well as many of his works on optics, contributed greatly to the development of physics. Ibn Sina's relativity of motion, the relationship between inertia, force, mass and acceleration, rotational motion, centripetal force, linear velocity, space and atmospheric pressure, convection, nature of heat, types of heat transfer, types of lightning and thunder, thunder, sound and light Most of his views on speed, light dispersion, lens, atomic structure, and other topics are very much in line with modern concepts. Mirzo Ulugbek built the only observatory in the world in the 15th century. In his book Ziji Koragoniy, he explained the theoretical foundations of astronomy and gave the coordinates of the location of 1,018 stars with great precision. Its values are very close to current values.

The development of classical physics. By the 17th century, G. Galileo had studied mechanical motion experimentally and discovered the need to express motion on the basis of mathematical formulas, which led to the rapid development of physics. He points out that as a result of the interaction of objects, the velocity changes and acceleration occurs, and in the absence of the motion, the state of motion does not change, that is, the acceleration is zero or the velocity is kept constant. The law later defined by Galileo was called the law of inertia or Newton's first law of mechanics. In 1600, Gilbert became famous for his study of electrical and magnetic phenomena, proving that the Earth was a living magnet. Using the above principle, E. Torrichelli determined the existence of atmospheric pressure and created the first barometer. R. Boyle and E. Mariott determined the elasticity of gases and created the first law for gases - Boyle-Marriott's law. Dutch astronomer and mathematician W. Snellius and R. Descartes discovered the law of refraction of light. One of the greatest achievements of seventeenth-century physics was the creation of classical mechanics. In 1687, Newton summarized the ideas of Galileo and his contemporaries and described the basic laws of classical mechanics. Newton's introduction of the concept of the state of bodies was important for all physical phenomena, and the state of the system of bodies was completely determined in mechanics by their coordinates and impulses. gave. H. Poygens and G. Leibniz described the law of conservation of momentum. The discovery of electricity by the Italian scientists A. Galvani and A. Volta, and the creation of the world's first galvanic cell in 1800, played an important role in the development of physics. In 1820, the Danish physicist H. Ersted explained the interaction of a current-carrying conductor with a compass shaft by the connection between electrical and magnetic phenomena. During these years, A. Ampere came to the conclusion that all magnetic phenomena are related to the electric current generated by the orderly motion of charged particles, and he experimentally invented a law that describes the force of interaction between current conductors (Ampere's law). In 1831, M. Faraday discovered the phenomenon of electromagnetic induction and developed the theory of the electromagnetic field.

By the middle of the 19th century, experiments had shown that the amount of work done was comparable to the amount of work done, and that heat was a special type of energy. The law of conservation and circulation of energy is the basic law of the theory of thermal phenomena and is called the first general law of thermodynamics. This law was passed by Yu.R. Described by Mayer, the German physicist G. Helmholtz took a more precise form (1874). In the development of thermodynamics, S. Carnot, R. Clausius, U. Thomson, E. Clapeyron, and D.I. The services of the Mendeleevs were great. S. Carnot determined the transformation of heat into mechanical motion, R. Clausius, U. Thomson described the basic law of thermal theory - the second general law of thermodynamics, R. Boyle, E. Mariott, J. Gay - Lussac, B. Clapeyron determined the equation of state of an ideal gas. D.I. Mendeleev generalized it to all gases, and so on. Along with thermodynamics, the molecular-kinetic theory of heat developed. A. Einstein, the Polish physicist M. Smolukhovsky, and the French physicist J. Perrin, proved that Brownian motion is the thermal motion of atoms and molecules, and developed the quantitative theory of Brownian motion, which is the basis of molecular kinetic theory. This, in turn, led to the full recognition of statistical mechanics. J.K. Based on Maxwell's probabilistic statistical concepts, it was possible to find the average values of the velocities of molecules in gases, the length of free run, the number of collisions per unit time, and other quantities, depending on the average kinetic energy of the molecules. The development of the kinetic theory of matter led to the creation by L. Bolsman of statistical mechanics - Bolsman statistics. In the second half of the nineteenth century, J.K. Maxwell developed a new theory of electromagnetic phenomena based on the concept of the electromagnetic field and a system of corresponding equations representing it. He discovered the existence of electromagnetic waves in nature, their specific properties - pressure, diffraction, interference, speed of propagation, polarization, and so on.

The division of physics into classical and non-classical physics is conditional. Galileo-Newtonian mechanics, Faraday-Maxwell electrodynamics, Bolsman-Gibbs statistics are generally incorporated into classical physics, field quantum theory, and the theory of relativity into modern physics. Maxwell's study of electromagnetic phenomena culminated in his creation of Classical Electrodynamics. In 1897, J. Thomson's discovery of the electron particle marked the beginning of a new era in the development of physics. Radiation occurs discretely as electrons "jump" from one steady state to another. This postulate was confirmed in experiments conducted that year by J. Frank and G. Gers. Einstein dealt with the problem of universal gravitation, and in 1916 he developed a new theory of space, time, and gravity, the General Theory of Relativity (UNN).