THE ROLE OF PARTICLE PHYSICS IN THE FORMATION OF EXPERIMENTAL SKILLS IN STUDENTS

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https://doi.org/10.5281/zenodo.7953497

Abstract. *This article highlights the important aspects of particle physics in the formation of experimental skills in students. In studying the results of research in the field of particle physics, the formation of experimental skills of students is described.*

Keywords: *natural sciences, matter, elementary particle, quark, lepton, fundamental particle, physical research, science, education, production, integration.*

In the context of the development of world education, scientific knowledge and the change of its paradigms, natural sciences, including physics, are considered as a multifactorial phenomenon affecting the development of the intellectual potential of a person. In such urgent fundamental problems as the widespread use of computational mathematics methods and information and communication technologies in modern physical research, interdisciplinary scientific research, the complexity of the technical and physical experimental base, the globalization of physical research (for example, the Large Hadron Collider (Switzerland), Tevatron (USA), DESY (Germany)) it is required the training of modern competent researchers who work in mutual cooperation. For example, scientists from almost all countries of the world participate in the above-mentioned centers. Therefore, conducting research in the field of particle physics is relevant today. Because there is no field that particle physics has not been penetrated. It is enough only to say that the computer industry and IT technologies have been born in these centers.

In this regard, the tasks of using interactive educational methods in teaching physics, the integration of traditional and modern methods of teaching physics, their incorporation on the basis of information and communication technologies, and the gradual development of students' educational and research skills are becoming more and more important. In our republic, in the conditions of informatization and globalization of education, integration of science, education and production, it is becoming necessary to train competent personnel capable of comparing, analyzing, summarizing and drawing conclusions, making independent decisions in problematic situations, conducting systematic research and putting positive results into practice.

Physics is one of the most developing sciences today. The purpose of physics, which is considered one of the most basic sciences of natural sciences, is to determine the essence of natural phenomena, to know the laws of nature, and to reveal ways of using them in practice. It is the study of material existence as a whole, on the basis of the whole system of natural sciences, without separating from each other.

Physics is a science that studies nature and its general laws. Therefore, physics and its laws are the basis of natural knowledge. The penetration of physics into other natural sciences is so versatile that new natural sciences appear at their junctions. Between physics and chemistry, there are wide fields that belong to both of them, and even special sciences called physical chemistry

and chemical physics have emerged. This is how astrophysics, which studies the physical phenomena occurring in the celestial bodies, and geophysics, which studies the physical phenomena occurring in the Earth's atmosphere and the Earth's crust, have been created. Discoveries in the field of physics have often stimulated the development of other sciences. The invention of the microscope and telescope accelerated the progress of biology and astronomy. Spectral analysis, discovered by physicists, became one of the main methods of astrophysics, etc.

At the end of the 1940s, 15 elementary particles were known, and at the end of the 1970s, their number reached 400. Are elementary particles random pieces of matter, or is there some order hidden in their interactions? In recent years, the development of physics has shown that the world of subatomic particles is characterized by a strong structural order. On the basis of this arrangement are fundamental physical interactions. Today, the structure of matter is studied at the quark-gluon level.

The goal of studying particle physics is to understand how quarks, leptons, and gauge bosons are elementary particles in the Standard Model. They are also called *fundamental particles*. Quarks and leptons are fermions and have a spin of 1/2. The spin of the calibration bosons is equal to 1. Fundamental fermions and bosons have different functions. Fermions are small building blocks of substance, but are also sources of fields that provide fundamental interactions. Calibration bosons are the quanta of this field and have two forms - real particles directly observed in experiments, and virtual particles - effect "carriers". Quarks and leptons form three generations, each consisting of two leptons (with 0 and -1 charge) and two quarks (+2/3 and -1/3 charge). The acquisition of this knowledge by students leads to the formation of experimental skills.

It is known that the events in the process of the microcosm cannot be seen with the eyes and cannot be grasped with the hands. Therefore, to study the processes taking place there, complex and expensive electronic equipment is required. Therefore, it is very important to implement virtual laboratories in the school education system. In order to form experimental skills, conducting laboratory work "Study of the properties of elementary particles with the help of ICT" allows students not only to achieve the goal of laboratory work, but also to have an idea of the physical characteristics of particles, the implementation of conservation laws in them, the internal structure of matter, which means analysis and drawing clear conclusions. The student's own analysis of the problem as an element of problem-based education activates the cognitive-mental capacity of students in laboratory work.

Today, in textbooks existing on the sections of the "General Physics" course, which is included as a subject for students of the field of physics and astronomy of pedagogic higher educational institutions, modern information is included with systematic description. Rational thinking in physics is always based on data from experience. The structure of practical classes in the physics course should be focused on defining the educational problem and involving students in their active solution. The solution of the educational problem is expressed in the form of a problem, question or assignment that cannot be obtained according to a ready-made sample. Here students are required to be independent and self-expressive.

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