IMPROVING THE METHODOLOGY OF ORGANIZING PRACTICAL CLASSES OF THE ELEMENTARY PARTICLE PHYSICS DEPARTMENT OF GENERAL PHYSICS

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Resume: This article talks about improving the content and organization of practical training in elementary particle physics.

Key words: elementary particle, strange, charming, isotopic space, interaction, classification, methodology, higher education, pedagogy, lecture, pedagogical technology, innovative method.

We know that the main purpose of teaching physics is, firstly, to explain the fundamental laws of nature on a scientific basis, to develop students' scientific worldview and philosophical reasoning abilities, to form ideas about physical processes that explain the principle of operation of equipment and tools used in technology and life, and secondly, to continue education, is to create a solid foundation for deepening the acquired knowledge and continuing scientific research.

Problem solving is important in teaching physics. Problem solving is an integral part of the process of teaching physics, in which theoretical knowledge is strengthened in every way, physical concepts are formed, physical thoughts are developed, the skills and competences of practical application of the acquired knowledge are formed and developed. By solving physics problems, it is possible to provide new information, create problematic situations and pose problems to students, form practical skills and abilities, test the strength and depth of students' knowledge, strengthen, generalize and repeat theoretical material, introduce technical achievements, and develop students' creative abilities. Through problem solving, students are taught to think and act independently.

The main shortcoming of the student is that he tries to solve the problem using ready-made formulas without understanding the condition of the problem and without discussing it sufficiently. One of the didactic problems that arise in this case is that the student cannot imagine the imaginary model of the physical process taking place in the given physical problem. Especially in the particle physics branch of physics, most of the problems are related to imagination. As a result of the student's encounter with the above-mentioned problems during

problem solving, his effort to solve the problem fades away. As a result, for him, the content of the subjects, the science of particle physics in general, is lost.

In order to solve the pedagogical-didactic problems mentioned above, it is necessary to develop the content of practical classes in particle physics in pedagogical higher education institutions, and for this purpose, to prepare materials consisting of practical issues that serve to strengthen the theoretical topics sufficiently for practical classes. it is required to explain in connection with various equipment and devices used in science and technology, medicine and other fields. It is natural that this, in turn, arouses the interest of students.

A good mastering of the Elementary Particle Physics section depends on the strengthening of the theoretical knowledge gained during the lectures during the practical sessions. Theoretical knowledge seems to be understandable in lecture classes, but in reality it is not embodied as a whole in the student's mind. The theoretical knowledge given in practical training is further strengthened as a result of the analysis of various processes and ensures the integrity and embodiment of this educational subject.

The main part of the problems in the physics of elementary particles is the analysis of the processes of decay or interaction of particles. Of course, depending on the type of interaction, these processes depend on the conservation or non-conservation of quantum numbers such as energy, momentum, angular momentum and spin, isotopic spin, strangeness, and charm. Students should be able to analyze these processes well and develop some skills in them. If theoretical knowledge is not strengthened by practical training, students' knowledge and imagination will be superficial.

Symmetries and quantum numbers in the world of particles, how they behave in various fundamental interactions - preservation or destruction, study and analysis of the participation of particles in various interaction processes, strengthening all acquired theoretical knowledge, formation and development of ideas about the world of particles by solving problems in practical exercises can be increased.

The peculiarity of solving problems from particle physics is that the processes taking place in the world of particles cannot be seen with the eyes, and they are based on deep imagination.

We will consider some issues and ways to solve them in order to organize practical classes on particle physics in educational institutions of higher education and explain the processes taking place in the world of particles.

Matters from particle physics are classified according to the decay process, participation in interactions, fulfillment and non-fulfillment of conservation laws.

1. If the process takes place in the form $a + b \to c + d + f + \cdots$, it is a strong interaction process. We can cite the following as an example of this process. If we take the formation of the $\pi^0 -$ meson during the interaction, we can see the birth of the neutral π^0 −meson in the collision of two protons. The reaction of this process is as follows

$$p + p \to p + p + \pi^0$$

2. For this process to take place, the kinetic energy of protons must be sufficient for the formation of the π^0 meson with a mass of 135 MeV. The kinetic energy of the protons before the collision π^0 meson rest mass is reflected, and the rest of the energy is distributed as the kinetic energy of the three particles produced.

Along with conservation of energy, we can also see conservation of electric and baryonic charge.

The particles participating in the flow are p baryons and π^0 mesons and belong to the class of stable hadrons. Hadrons participate in the strong interaction. Since π^0 mesons is a true neutral particle ($\pi^0 = \bar{\pi}^0$), it does not participate in the electromagnetic interaction.

So, this process takes place as a result of strong interaction.

The decomposition process takes place in the form a→b+c... This process is weak interaction. Since the weak interaction mainly involves leptons, the pure lepton process $\tau^- \to \bar{e} + \bar{\nu_e} + \nu_\tau$ and the half or non-pure lepton process depending on the derivatives is divided by $\tau^- \to \pi^- + \nu_\tau$. As an example of these, we can cite the following.

As we know, any quantum system tends to be in a minimum energy state. The lowest energy state corresponds to the lowest mass. This is why most heavy particles break down into light particles. If we take the decay of a proton into a positron and a photon, energy and electric charge are conserved.

$$p \to e^+ + \gamma.$$

However, the transformation of proton into light particles is prohibited by the baryon charge conservation law $p \nrightarrow e^+ + \gamma$, that is, this process does not occur.

Based on the above, the particles formed during the decay cannot be considered as a component of the decaying particle. This means that the decaying particle is not composed of the forming particles. Fission particles are formed directly in the fission process.

Before solving problems in practical training, it is advisable to repeat the laws, dimensions, processes and legalities related to the subject of the training. It has been found that this repetition is effective through modern teaching methods

used by the teacher. It is important to choose the method used in such a way that it can determine the content of the training.

By solving and analyzing the problems mentioned above and similar, we can see the phenomena and processes in the world of particles that cannot be grasped with our hands and are based on deep imagination. This, in turn, leads to a deep understanding of these processes in the student (future teacher), develops their worldview, and expands their independent thinking.

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