

## PROBLEMS AND SOLUTIONS OF TEACHING MODERN PHYSICS IN HIGHER EDUCATION

---

*Associate Professor of Kokand  
State University- PhD N.Z.Mamadaliyeva*

**Annotation.** The article analyzes the issues of what new courses should be introduced as a special subject for bachelors, masters and students of retraining and advanced training courses for teachers in the "Physics" training direction, the scope of teaching the selected subjects, what criteria should be used in their selection, its naming, in particular, the term "modern physics", its content - essence and differences from "classical" physics, theoretical analyses and solutions, as well as some current issues of teaching modern physics as a special elective subject.

**Keywords:** Modern Physics, Higher Education, Pedagogical Challenges, Curriculum Development, Conceptual Understanding, Quantum Mechanics, Active Learning, Educational Technology, Problem-Solving Skills, Teacher Training.

Among the reforms being carried out in the socio-economic spheres in Uzbekistan, great importance is also attached to the sphere of science and education. In special programs aimed at ensuring the implementation of the above-mentioned resolutions, a number of urgent tasks were set, aimed at developing the material and technical base of higher educational institutions of our republic, improving the quality of educational and methodological, pedagogical personnel provision, improving the quality of teaching physics, introducing modern teaching methods into the educational process, selecting talented students, training competitive specialists for the labor market, developing scientific research and innovations, and ensuring the practical effectiveness of these tasks. From this point of view, the development and implementation of practical measures to comprehensively support fundamental scientific research in the field of physics, increase the efficiency of the system of training scientific personnel, and deepen the integration of "science - education - production - territory" are among the urgent issues of today. This, in turn, is an impetus for the development of fundamental sciences, especially physics. It should be noted that physics is currently one of the most rapidly developing sciences. Over the past few decades, the highest level of physical discoveries has been made. This, on the one hand, has led to the emergence of new powerful theoretical ideas and methods, and on the other hand, to the creation and use of new scientific instruments, techniques and technologies. The results of groundbreaking discoveries, scientific innovations, and research in the world of physics have been accompanied by great debates, discussions, and controversies, but they have been partially included in the standards, curricula, and

plans of higher and secondary education, and this process continues. Indeed, if we talk about physics, schoolchildren and even students study physical phenomena discovered before the beginning of the 60s of the 20th century. Only occasionally, when a discovered physical phenomenon leads to a technological discovery, it quickly becomes known to students and schoolchildren, including the general public. For example, laser physics, which was introduced into the educational process very soon after its discovery, is an example. However, this situation is not an exception to the rule. Thus, the vast ideological, experimental and technical knowledge that modern physics lives on is not known to those who will “acquire” this knowledge in the future. In the eyes of schoolchildren and students, physics 1 President of the Republic of Uzbekistan Sh.M. Mirziyoyev's decrees No. PQ-2909 dated April 20, 2017 “On measures for the further development of the higher education system” and No. PQ-5032- 31 dated March 19, 2021 “On measures to improve the quality of education in the field of physics and develop scientific research” seem to be a frozen system, in which even minor changes are very rare. The worst thing is that the idea of physics was created for teachers, present and future, and they are given to schoolchildren. The created situation is becoming one of the main factors leading to a decrease in young people's interest in natural sciences, primarily physics. There are several objective and subjective reasons for the lack of sufficient information about modern physics in university and school programs. The most important objective reason is the complexity of physical phenomena in the space that modern science lives in. Its development process shows that the more deeply we understand and perceive nature, the more we move away from it directly through our own senses. This fact was noted by Aristotle, and over the past two thousand years this situation has never changed. The development of the universal mind and the complexity of the tasks facing humanity are in dynamic equilibrium, allowing the development of natural knowledge. This situation inevitably leads to a lag of a particular science from its research base to the level of teaching. And in general, this is not surprising. This has been the case in the history of science, and the only thing we can demand is that this lag is not too great. However, the relationship between science and education at different stages has made it possible to reduce this gap. At the present stage of the development of physics, the gap between scientific and pedagogical ideas about physics is growing again. The reason for this, in our opinion, is the insufficient development of the methodology for teaching students and schoolchildren the basics of modern physics. True, recently publications have appeared, in which the methodology for teaching students on certain issues of modern physics through seminars is being developed. At the same time, the use of other traditional teaching methods, primarily lectures on modern physics, is almost not considered. In addition, the issue of general principles for organizing the training of students of pedagogical universities on modern physics issues is almost not raised in

the scientific and methodological literature. Thus, a conflict arises between the developing physics and the issues of its teaching. The need to teach the basics of modern physics at school in order to increase students' attention to natural sciences, to create an emotional environment that arouses their constant interest in physics, and to fully implement such training in lectures on modern physics issues in special courses, as well as within the framework of special practice and through the completion of course and diploma works, is not possible. How to solve this problem? For example, the following can be done: - by adding modern physics to the content of the main courses, increasing its volume, which requires additional time and is very problematic in the current trend of reducing the number of hours allocated to natural sciences; - introducing the subject of "modern physics" into the timetable. It can also be observed that at present it causes great difficulties due to the lack of free hours, methodological manuals, trained teachers, etc.; - introducing additional courses on the selection provided for in the second generation standards, while preserving the rest of the system of teaching general and theoretical physics. This stage, in our opinion, is the right choice and the most optimal. At the same time, we do not deny the other two options, but in these cases it will take relatively more time to prepare. The purpose of the research is the process of training a physics teacher in higher pedagogical educational institutions. The subject of the research is the method of forming the knowledge of physics students of pedagogical higher educational institutions in the field of modern physics. The purpose of the study is to improve the system of teaching the basics of modern physics by introducing special courses into them, taking into account the requirements of the state standard of higher pedagogical education for future physics teachers, as well as to develop a model program of one of such special courses (for example, "Physics on the threshold of the third millennium") and develop a methodology for conducting it. The study is based on the following hypothesis: if you include special lecture courses on this topic in the system of teaching modern physics in a higher pedagogical educational institution as the main component of teaching, this will allow you to: form students' broad understanding of the modern physical picture of the world (a single physical picture of the universe), which reflects the latest scientific discoveries and hypotheses that describe, explain and predict the behavior of physical systems in the microcosm, macrocosm and megacosm; increase the level of scientific training of students and their readiness to conduct classes with students, which will help stimulate their interest in natural sciences; It allows students to create competencies that will inspire interest in studying physics for themselves and their future students. based on the analysis of the current state of physical research, taking into account the importance of certain areas of physics for the development of fundamental science, technology and all mankind, as well as the psychological and pedagogical characteristics of education, develop criteria for selecting the content of

educational materials. Development of the content, program and methodology of conducting special courses on modern physics for students of the Pedagogical University for students of pedagogical higher educational institutions, in particular, the special course "Physics on the threshold of the third millennium"; Implementation of the developed course in the practice of teaching students in several pedagogical higher educational institutions of the Republic of Uzbekistan, conducting questionnaires, providing an opportunity for pedagogical verification of the effectiveness of students' study of the essence of physical phenomena related to modern physics. At the same time, it will be possible to determine the possibility of experimental verification of the research hypothesis in the processes.

#### **List of used literature**

[1].S.O. Saidov, M.F. Atoeva, Kh.A. Fayzieva et al//Psychology and education 2021. V. 58(1). P. 3542-3549.

[2].S.O. Saidov, M.F. Atoeva, Kh.A. Fayzieva et al//The American journal of applied sciences. Issn: 2689-0992. Sjif 2020: 5.276. 2020. V. 2.

[3]. S.O. Saidov, Z.I. Tuksanova. Central Eurasian Studies Society/International scientific conference «INNOVATION IN THE MODERN EDUCATION SYSTEM» JANUARY 25, 2021 WASHINGTON, USA.

[4].S.O. Saidov, I.M.o. Badriddinov. Some current issues of modern physics teaching in higher education. National studies in Uzbekistan:

[5]. Mikhailishina G.F. Izuchenie sovremennoy physical and pedagogical vuze. Dissertation na soiskanie uchenoy stepeni candidate pedagogicheskikh nauk // Moscow, 2002. 288 p. RGB OD, 61:02-13/2035-2 <https://qomus.info/oz/encyclopedia/f/fizika/>