



# The Use Of Information And Communication Technologies In Teaching Elementary Particles Physics

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## ABSTRACT

This article presents examples of the development of the content of the section "Particle Physics" based on computer technology, the development of descriptions of complex topics based on information technology, which makes it possible to increase the effectiveness of its teaching.

## Keywords:

Elementary particle physics, electronic learning complex, interdisciplinary communication.

## Introduction

Today, as in all areas of education, the effective use of information and communication technologies is one of the most pressing issues. In particular, the state takes many measures to improve the quality of education by providing modern software for the effective use of information and communication technologies. The development of information and communication technologies has a positive impact on all areas, including education. [1-2].

Teaching in higher education should not only give students a deep understanding of modern knowledge, but also ensure a strong and deep mastery of basic physical concepts and laws, the systematic nature of their teaching using information and communication technologies.

## Main Part

The foregoing shows that the implementation of the principle of consistency is important in teaching physics and in the training of future teachers of physics. Therefore, in order to more fully reveal the didactic basis of the principle of consistency in teaching physics, we will reveal the essence of the problem of consistency in philosophy, physics and education.

For example, in the teaching of elementary particle physics, it is advisable to describe the sequence of development of this area, i.e., the development of this section as a result of the discovery of particles, the emergence of new problems and their solution. The same picture is observed in other branches of physics. In the teaching of elementary particle physics, the "atomic age" is repeated in physics, repeating and memorizing topics such as the phenomenon of radioactivity and the

discovery of electrons, Thomson's model of the atom, Rutherford's experiments, Bohr's postulates, nuclear structures, etc. The non-electric charge of nuclear forces. and through so-called "nuclear era" it is clear that it is necessary to maintain the sequence of studying the nature of the so-called. "strange particles", "charming particles", etc. observed for the first time in the experiment.

Currently, information and communication technologies are used in the organization of the educational process, which contribute to the activation of this process.

Power Point, which is now part of Microsoft Office, is widely used in preparing presentations. Below are examples of presentations made for students studying in the specialty "Methods of Teaching Physics and Astronomy" in higher educational institutions.

### Material Method

**How to use the presentation:** In 1911, E. Rutherford bombarded a thin gold plate (foil) with  $\alpha$ -particles ( $\alpha$ -particles are doubly ionized helium nuclei) in order to prove the fallacy of Thomson's model. The hole inside the lead part contains a radioactive source - radium. Alpha particles emanate from the source in all directions. However, alpha particles are absorbed in all directions except the direction of the crack in the lead. A handful of alpha particles from the crack fall perpendicular to the gold foil. Lightning is formed at the points where particles that have passed through the foil hit a screen coated with a luminescent layer. Based on these observations of lightning, information was obtained on the scattering of

alpha particles as they pass through the foil [3-4].

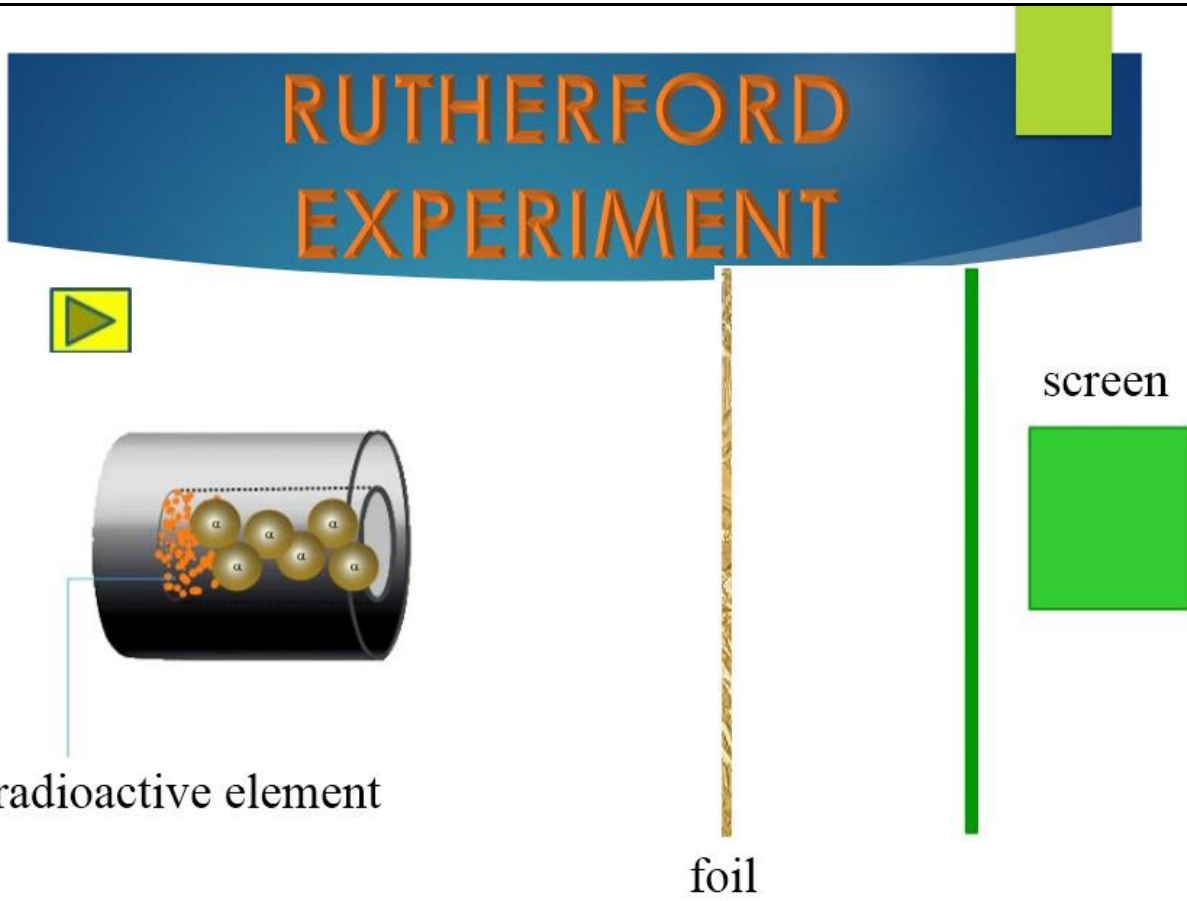
Observations show that most alpha particles do not change direction or bend at very small angles. Even returning alpha particles have been observed. E. Rutherford, who studied this scattering, comes to the following conclusions:

1. There must be a strong electric field around the atom and most importantly inside it so that alpha particles fly apart at such angles;
2. In order for alpha particles to scatter at such angles, the mass of the atom must not be scattered throughout its volume, but its mass must be concentrated in some small volume, and this volume must have a positive charge.

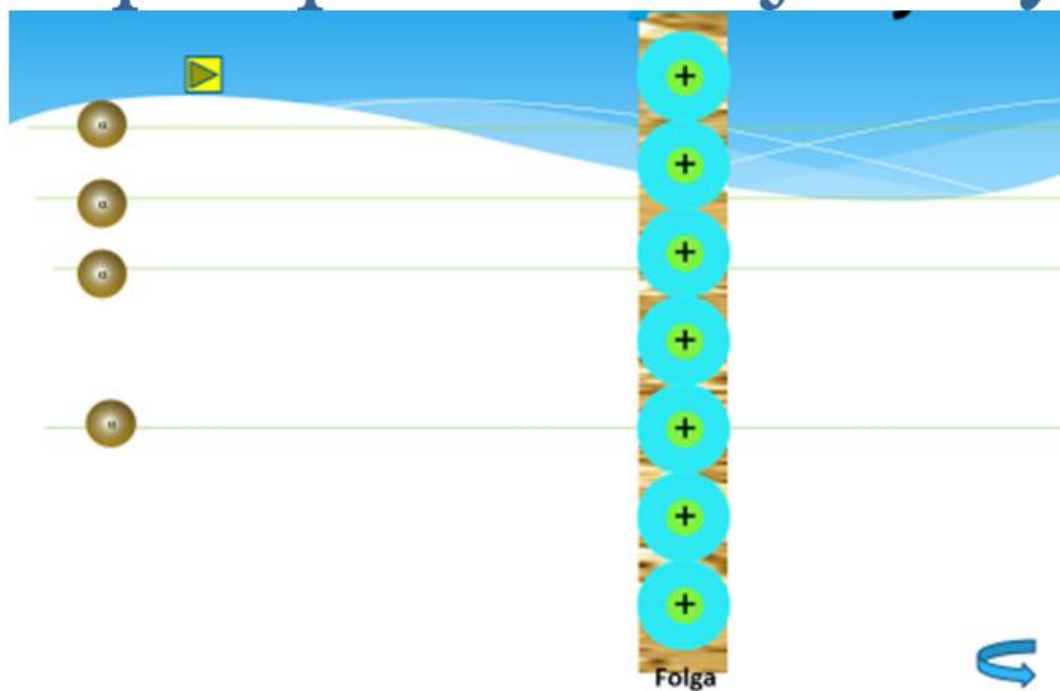
Therefore, during the passage of the foil, the main interaction is a positively charged ( $+Ze$ ) field, which contains an alpha particle equal to  $+2e$  and the main mass of the atom (this field is commonly called the nucleus, i.e., "main"). As a result, the alpha particle, approaching the nucleus, bends at a greater angle than the alpha particle, moving away from the nucleus further, since the repulsive force between the alpha particle and the nucleus is inversely proportional to the distance between them. An alpha particle moving towards the right nucleus is slowed down by the Coulomb force and then returns. Quantitative calculations based on the laws of classical physics confirmed Rutherford's hypothesis. [5-6].

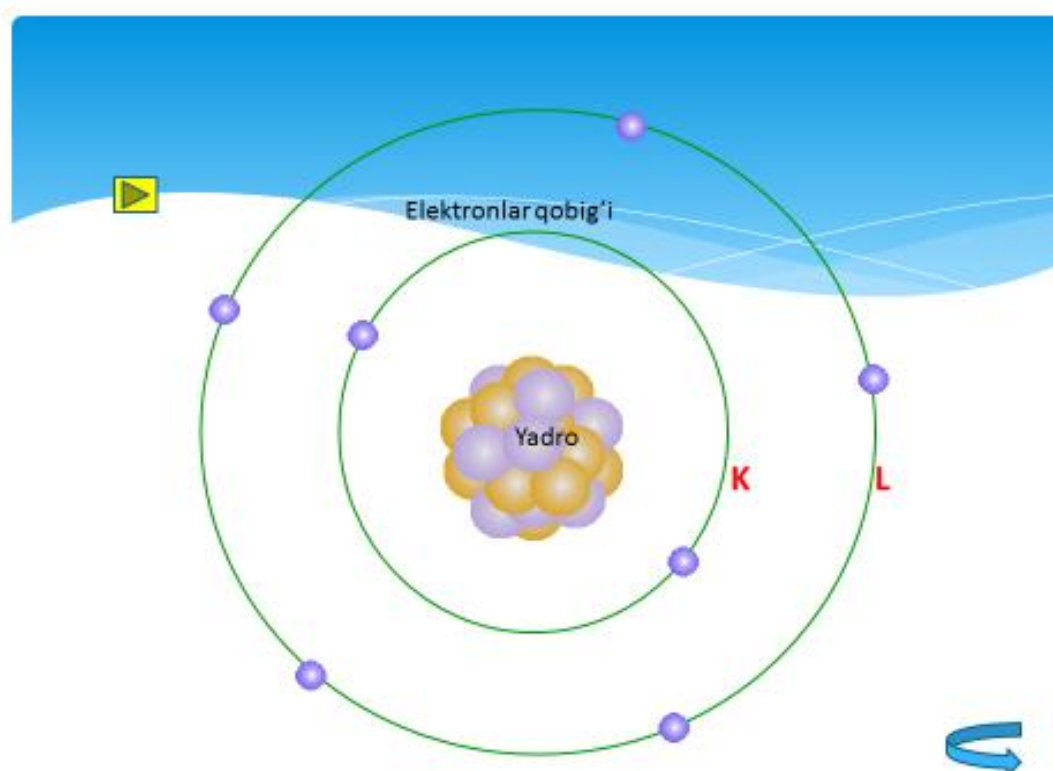
**The sequence of preparation of the presentation:** Fill out the first page of the Power Point document as follows:

Below is the sequence of preparing the above presentation on a computer [7].



# Alpha particle trajectory





## Conclusion

Thus, the topic of elementary particle physics is currently taught in the 9th grade of general education schools with basic concepts and in the 11th grade with extended concepts. This knowledge serves as a solid foundation for the knowledge they receive in higher education.

The use of information and communication technologies in physics lessons can be used with confidence that students will be more interested in science and technology, news and will be able to quickly receive news through a computer.

In addition, we provide them with the opportunity to test their abilities outside the classroom (to test the knowledge acquired at school on the Internet outside of school). At the same time, you can develop their interest in computer science and physics.

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