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ORGANIZATION OF EDUCATION INDEPENDENT OF ATOMIC PHYSICS ON THE BASIS OF A COMPREHENSIVE APPROACH

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Abstract:
This article describes a methodology for organizing education independent of Atomic Nuclear Physics on the basis of interdisciplinary and Inter-training integration.

Keywords: Atomic and nuclear physics, Frank-Gers experiment, Independent Education, virtual laboratory, nuclear physical technologies.

Introduction

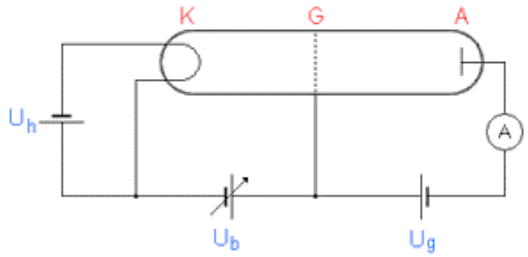
Although atomic and nuclear physics are a relatively new branch of science, unprecedented advances have been made in this field for more than a century. The achievements of atomic and nuclear physics radically changed humanity's thoughts about the universe of existence, the concepts of space, time and matter were reshaped on the basis of quantum mechanical representations. The second aspect of the progress of this science is its practical importance, and now the equipment and devices based on nuclear physical technologies are used in many areas. This in turn leads to the need for specialist personnel who have mastered these technologies. This situation logically imposes great responsibility on pedagogical higher education institutions preparing future teachers, including the future physics teacher.

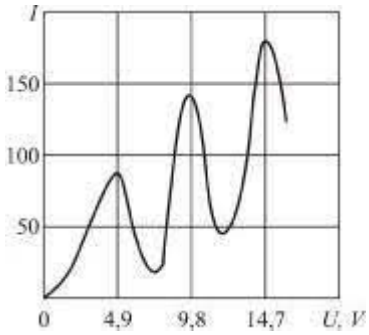
In the program for training future physics teachers, the Department of atomic and nuclear physics has its own aspects as the closing stage of the general physics course. These include such requirements as having mathematical concepts to study science, mastering other sections of the course well, the need for elements of imagination, logical thinking.

In order to increase the effectiveness of mastering the science of atomic and nuclear physics, it is important to properly organize independent education in theoretical, practical and laboratory training. This article describes the methodology for organizing independent education in atomic physics using the example of a laboratory study on the “Frank – Gers experiment”. First of all, let's look at the Frank-Gers experience and its essence.

Frank-Geers confirmed the quantum property of the atom that there are discrete energetic levels in the atom (postulate 1 of boron), that electrons in the atom emit radiation of a certain frequency when they move from the awakened state to the lower or primary state (postulate 2 of boron), and in Einstein's phrase it was a perfect experiment that “makes a person cry The main part of the experimental device is an electronic tube. 1 mm in the tube (glass balloon).sim.who. there were mercury vapors under pressure. Electrons emitted from the” K " cathode accelerate in the field between the cathode and the lattice (the difference in accelerating potentials it is superimposed on) and slow down in the field between the lattice and anode A. Electrons heading from the cathode towards the anode collide with mercury atoms. The anode is placed after the net and a weak braking potential is placed between them.

It was the insertion of this potential that was one of the important elements of the experiment (Figure 1). In experiments, the difference in electron-accelerating potentials with the current force generated by the electrons falling on the anode is plotted on a graph of the bond between it. (Figure 2





1-rasm 2-rasm

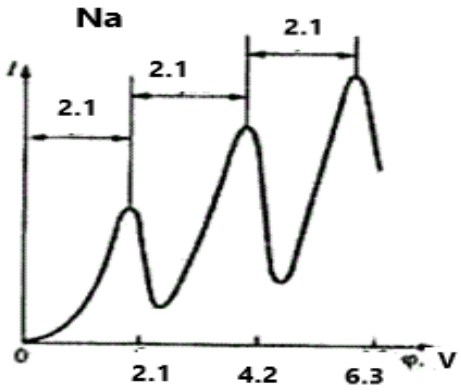
This laboratory work can be done in a real or virtual laboratory. In this, students learn based on the Volt Ampere characteristic of the Frank – Gers tube through a sharp decrease in the current strength in the graph corresponding to the first awakened resonance line of the mercury atom. The periodic repetition of sharp drops of current in the Volt-Ampere characteristic is explained by elastic and inelastic collisions of electrons with mercury atoms in the tube, as well as the effect of the braking potential on them.

In order to study the topic perfectly, students need to be given assignments for independent completion. These tasks should include computer programs and mathematical calculations using theoretical, practical, experimental knowledge on the subject. Let's look at the following assignments as an example.

Task 1. In the Frank-Gers experiment, if a different element is used instead of mercury vapors, explain how the results of the isolate change and the reason for this change.

When a sample of completing a task is seen using the example of a sodium element, the result will look the same as in Figure 3.

The 2.1 eV energy emitted by the sodium atom belongs to the resonance line of the sodium atom. That is, there is a resonance transition when the sodium atom emits 2.1 eV of energy. It can also be given as an independent task to determine what a graph will look like if experiments with potassium (K) or hydrogen (H) atoms are carried out. Such an assignment leads to an expansion of the scientific worldview of students, an increase in logical thinking.

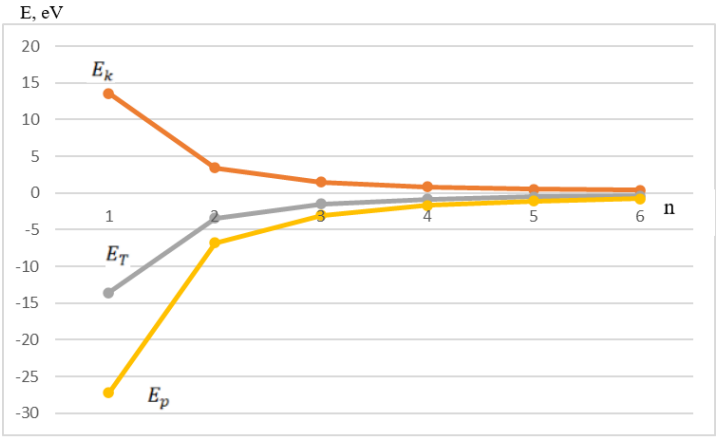


3-rasm

Task 2. Based on boron theory , confirmed in the Frank Gers experiment,draw and analyze graphs of change of electron kinetic, potential and full energy in different electron shells ($E_p = f(n)$, $E_k = f(n)$ $E_T = f(n)$) in different energetic states in hydrogen and hydrogen atoms based on computational results.In doing so, students can make graphs based on computational results based on the knowledge they have learned in lectures and practical classes. Table 1

n	E_T	E_k	E_p
1	-13,6 eV	13,6 eV	-27,25 eV
2	—3,40 eV	3,40 eV	-6,81 eV
3	-1,5eV	1,5eV	-3,02eV
4	-0,85 eV	0,85 eV	-1,70 eV
5	-0,544 eV	0,544 eV	-1,09 eV
6	-0,38 eV	0,38 eV	-0.757 eV

The calculation results, calculated by putting numerical values for the hydrogen atom on the basis of $E_T = \frac{E_{T1H}}{n^2}$ $E_k = \frac{E_{k1H}}{n^2}$; $E_p = \frac{E_{p1H}}{n^2}$ and related formulas in boron theory, are given in Table 1.
Based on the results of the calculation,the graphs obtained in the program $E_p = f(n)$, $E_k = f(n)$ $E_T = f(n)$ Microsoft Excel will look like this:



Such analyses can also be performed for $v_n = f(n)$, $r_n = f(n)$, $T_n = f(n)$ links.
The organization of Independent Education in the teaching of atomic physics on the basis of the above methods serves to increase the effectiveness of education on the basis of interdisciplinary and Inter-training integration in education.

References

1. Nasriddinov K.R., Xudayberdiyev E.N., Samandarov L.Q., Qosimjonov R.V. Umumiy fizika. Atom va yadro fizikasidan masalalar to‘plami. - Toshkent.: Malik print co, 2022. –226 b.
2. Chertov A.G. Vorobyov A.A. “Zadachnik po fizike” Moskva “Visshaya shkola” – 2001
3. E.N.Xudayberdiyev “Some notes on learning the Frank – Hertz experience” “Uzbek scholar journal” Volume 24, January 2024

4. А.А.Ахмедов, Э.А.Кудратов, Д.М.Холов. "Инновационные Технологии В Науке И Образовании" сборник статей победителей международной научно-практической конференции. 2016. Издательство: Наука и Просвещение. Пенза.
5. Б.Ф.Избосаров, А.А.Ахмедов, И.Р.Камалов. "Инновационные подходы к проведению лабораторных работ по физике". Новые технологии в образовании. 106-109.
6. E.N.Xudayberdiyev. "Bo'lajak fizika o'qituvchilarini tayyorlashda olamning fizik manzarasi bo'yicha tasavvurlarni shakllantirish". Academic research in educational sciences. 2021.
7. A.K.Kutbeddinov. "Generalization of uranium radio features in teaching natural sciencesak". Молодые ученые. 2023. 129-134.
8. I.R. Kamolov, G.I. Sayfullaeva -Formation of teacher's competence in the performance of laboratory and experimental works Journal of critical reviews. ISSN-2394-5125, 2020
9. D.I.Kamalova, S.N.Abdisalomova. "Zamonaviy innovatsion ta'lim". Journal of universal science research. Volume 1. Issue 1. 17 january, 2023. pp. 187-189.
10. Сарвиноз Тулкуновна Баракаева, Гулхаё Ихтиёровна Сайфуллаева, Сайибжан Садыкович Негматов, Нодира Сайибжановна Абед, Ихтиёр Рамазонович Камолов, Дилнавоз Ихтиёровна Камалова Методика получения композиционных образцов на основе термореактивных фурано-эпоксидных полимеров и органоминеральных наполнителей Universum: технические науки, 2021 1-1 (82) 42-45
11. L.K.Samandarov, E.N.Xudayberdiyev. Methodological problems of teaching the theory of particle-wave dualism for physics students. Theoretical&applied science. Теоретическая и прикладная наука. 256-262.
12. U.R.Bekpulatov. "Physical style of thinking-methodological basis for the formation of a scientific world view". Theoretical&Applied Science. 09(89). 183-188.
13. Ҳамроева Севара Насриддиновна, Камолов Ихтиёр Рамазонович. "Педагогика олий таълим муассасаларида бўлажак физика фани ўқитувчиларининг мантиқий фикрлаш қобилиятини stem таълим дастури асосида ривожлантириб ўқитишни такомиллаштириш". Science and innovation International scientific journal. volume 1. issue 6. UIF-2022. 2181-3337.
14. Каримова Ойниса Абдимуминовна. Активизация креативного мышления учащихся на уроке физики Традиции и новации в профессиональной подготовке и деятельности педагога. 227-229.
15. Azzamova Nilufar Buronovna, Nasriddinov Komiljon Rahmatovich. Electrodynamics As A Basis For Consolidating Knowledge Of Electromagnetism. Solid State Technology. 4(63). 5146.
16. У.Д.Шеркулов, А.М.Музафаров, Т.И.Солиев. Determination of mixing factors of daughter radionuclides in the uranium decay chain. Neuroquantology. September. 2022. Volume 20. Issue 11. London.
17. Sh.E.Khalilov, J.M.Khakkulov Z.Sh.Temirov. "Electrochemical Reduction Of Macroiones As A Surface-Active Nanocoating And Nanocomposites". The American Journal of Applied sciences. 2021.
18. Ж.М.Абдуллаев, Л.И.Очилов. "Изъятие пресной воды из подземных вод при помощи гелиоустановки водоносного опреснителя". Молодой учёный научный журнал. 2015/5. 274-276.
19. F.Nabiyeva. Issiqlik hodisalarini o'qitishga oid umumiy metodik tavsiyalar. «Science and innovation». 446-449.

20. Tursunboy Izzatillo ugli Soliyev, Amrullo Mustafoyevich Muzafarov, Bahriddin Faxriddinovich Izbosarov. Experimental determination of the radioactive equilibrium coefficient between radionuclides of the uranium decay chain. International Scientific Journal Theoretical&Applied Science. 801-804.
21. L.X.Turabova, D.I.Kamalova. Fizika fanini o'qitishda elektron o'quv qo'llanmalardan foydalanishning ahamiyati. "Polish science journal". Warsaw, Poland. Issue 4(37). April. 2021. pp. 222-225.
22. С.С.Канатбаев, И.Р.Камалов, Д.И.Камолова, Г.И.Сайфуллаева. "Universum: технические науки". Россия. Декабрь, 2016. №12(33). 38-40 стр.
23. Хушвақтов Бекмурод Нормуродович. "Innovative Fundamentals of Non-Traditional Teaching (on The Example of The Optics Department)" Journal of Ethics and Diversity in International Communication". e-ISSN: 2792-4017. www.openaccessjournals.eu. Volume.1 Issue.3.
24. A.R. Sattorov G. I. Sayfullaeva, Methodology of Application of Innovative Educational Technologies from Astronomy to Laboratory Activities 2021/10/29 European Journal of Life Safety and Stability (2660-9630) 125-128
25. O'.K.Sunnatova, G.I.Sayfullayeva. Making a vacuum cleaner using the stem education system in students' laboratory classes. Web of Discoveries: Journal of Analysis and Inventions. 2023. 43-47.
26. Sayfullaeva Gulkhayo Ikhtiyor Kizi, Shodiev Khamza Ruziculovich, Xaitova Shakhnoza G'olibjon Kizi Conditions For The Formation Of Teaching Innovation Activities Journal of Pharmaceutical Negative Results, 2023 2420-2423
27. Э. А. Кудратов Э. А. Аллаберганова, Г. М., Кутбеддинов, А. К., Каримов, А. М., Интерактивные методы обучения студентов естественных специальностей на основании радиационных факторов экосистемы. Педагогика и современность ISSN: 2304-9065
28. B. I Xojiyev, N.A. Ulugberdiyeva, AA Xo'jayev, AA Amonov Studying the transition processes in physics lessons Galaxy International Interdisciplinary Research Journal 10 (5), 873-876, 2022
29. Bozorova Aziza : Sayfullayeva Gulhayo Ixtiyor qizi Astronomiyadan stem dasturidan foydalanib quyosh soati mavzusini o'qitish - Yosh tadqiqotchi jurnali, 2022 35-38