Report on the work of the dissertation council for 2024

Dissertation Council at NPA "K. Zhubanov Aktobe Regional University" in the direction of training PhD and doctoral candidates in the profile 6D060400 – 8D05301 – Physics.

By the decision of the Academic Council of the NAO "K. Zhubanov Aktobe Regional University" dated May 20, 2022, protocol No. 12, the permanent composition of the dissertation council for the specialty 6D060400 - 8D05301 - Physics was approved (order No. 368-N dated 05/24/22):

Shunkeyev Kuanyshbek Shunkeyevich - Doctor of physical and mathematical Sciences, Professor, Chairman of the Dissertation Council, Hirsch index -13;

Sergeнev Daulet Maksatuly - candidate of physical and mathematical sciences, Professor, Deputy Chairman of the dissertation council, Hirsch index -10;

Sagimbayeva Shynar Zhanuzakovna - candidate of physical and mathematical sciences, Associate Professor, Scientific secretary of the dissertation council, Hirsch index - 8.

Kislitsyn Sergey Borisovich - candidate of physical and mathematical sciences, Member of the dissertation council, Professor at the Institute of Nuclear Physics (Almaty, Kazakhstan), Hirsch index - 10;

The Dissertation Council is authorized to accept dissertations for defense in the specialty 6D060400 – 8D05301 – Physics.

The report contains the following information:

1. Data on the number of meetings held.

In 2024, "Physics" Dissertation council held 1 (one) meeting.

2. Last names, first names, patronymics (if any) of the members of the dissertation council who attended less than half of the meetings - None.

3. List of doctoral students with indication of the educational organization.

№	Full name	The university where the doctoral student studied	Cipher	Date of defense	Committee decision, order number №, date
1	Duisenova Ainur Gaisievna	K. Zhubanov Aktobe Regional University	6D060400 – Physics	26 June 2024.	№968, 29.10.2024.

4. A brief analysis of the dissertations reviewed by the council during the reporting year, highlighting the following sections:

4.1. Analysis of the topic of the PhD student A. G. Duisenova's work:

The aim of the dissertation "Modeling the features of transport properties of electronic nanodevices based on fullerene-like materials" is to study the pattern of electric current flow through 0D, 1D and 2D van der Waals fullerene-like nanodevices using the example of endofullerene, polyprismane and bilayer graphenes using electron density functional theory in combination with the nonequilibrium Green's function method.

To achieve the aim, the following main tasks were set: search and selection of nanostructures with unique functional properties for the creation of electronic nanodevices, optimization of their geometry, construction of an adequate mathematical and computer model for calculating the behavior of nanostructures under the influence of an electric field; development of a model of a single-electron device based on endofullerenes, consisting of fullerenes with different diameters and interconnected by van der Waals forces, study of the mechanism of electron transport in such nanodevices; study of electronic transport in one-dimensional nanostructures

using the example of polyprismanes with different diameters, interconnected by van der Waals forces, development of recommendations for the use of such materials for the creation of promising nanoelectronic devices; analysis and physical interpretation of the results obtained during a model study of nanodevices based on fullerene-like materials, identification of patterns of electric current flow in nanodevices based on van der Waals fullerene-like materials.

The object of the research work is zero-dimensional fullerene structures forming a core-shell nanojunction, one-dimensional coaxially connected prismane nanotubes, as well as moiré bilayer graphene films. The subject of the research is the electrical transport properties of nanodevices based on fullerene-like materials

This dissertation used a combined theory-based approach electron density functional together with the method of nonequilibrium Green's functions, which allows one to calculate the transport properties of nanostructures and their electron densities. The density functional theory method is the main method for calculating the electronic structure of a many-particle system, which is based on the fact that any property of a system of interacting particles can be determined through the electron density functional ()nr . To achieve the set tasks, quantum chemical software systems were used for modeling and studying nanostructures, such as Atomistix ToolKit with Virtual NanoLab, Gaussian. When optimizing the geometry of the nanostructures under study within the framework of density functional theory, the generalized gradient approximation (GGA), exchange-correlation functionals PBE, and others were used. Visualization and correction of nanostructures was performed in the VESTA and GaussVIEW programs and mathematical calculation packages were also used. When calculating the total energy, electron density, charge stability diagram of single-electron devices, program codes written in Python were used.

4.2. In accordance with paragraph 3 of Article 18 of the Law "On Science," the relevance of dissertation topics established by the Higher Scientific and Technical Commission under the Government of the Republic of Kazakhstan to the development directions of science and/or state programs.

This dissertation work was carried out within the framework of two research projects funded by the Ministry of Education and Science of the Republic of Kazakhstan, “The study of quantum-transport characteristics of nanosystems with unique operational electrical and magnetic properties” IRN AP08052562 for 2020-2022, as well as “Atomistic modeling of destruction semiconductor structures by electromagnetic pulses" IRN AR14869773 for 2022-2024.

4.3. Dissertation results in practice fulfillment level analysis.

By the results of the research presented in the dissertation work, published 6 scientific works, from of them: 3 articles indexed in Science Citation Index Expanded Web Database of Science, and in peer-reviewed scientific publications that have a percentile ranking according to CiteScore in the Scopus database Results in Physics, Advances in Nano Research и Technical Physics Letters (quartile = Q1, Q2, Q4; percentile = 89, 86, 36); 2 articles were published based on the results of international scientific and practical conferences in peer-reviewed scientific publications, having a percentile ranking according to CiteScore in the Scopus database Materials Today: Proceedings, Journal of Physics Conference Series, (percentile = 42, 22), and 1 patent for a utility model.

5. Analysis of the work of official reviewers (with examples of the worst quality reviews).

Reviewers for the dissertations of doctoral candidates seeking the Doctor of Philosophy (PhD) degree were appointed in accordance with the requirements of the standard regulations on the dissertation council. Information about the appointed reviewers is provided below:

№	PhD student	Reviewers	
1	Duisenova Ainur Gaisievna	Abuova Fatima Usenovna – Doctor of Philosophy (PhD)	Kalkozova Zhanar Kanievna – Candidate of Physical and.

		(6D060400 – Physics), Associate Professor of the International Department of Nuclear Physics, New Materials and Technologies of the L.N. Gumilyov Eurasian National University, Astana, Kazakhstan.	Mathematical Sciences (01.04.07 – Condensed Matter Physics), Associate Professor of the Department of Solid State Physics and Nonlinear Physics of the Al-Farabi Kazakh National University, Almaty, Kazakhstan.

A comprehensive analysis was conducted by reviewers PhD F. U. Abuova and Associate Professor Zh. K. Kalkozova in the study of the regularity of electric current flow through 0D, 1D and 2D Van der Waals fullerene-like nanodevices using endofullerene, polyprismane and bilayer graphenes as examples using the electron density functional theory in combination with the nonequilibrium Green's function method.

The reviewers are highly qualified specialists in the field of condensed matter physics, specifically related to the dissertation topic of A.G. Duisenova.

There are no comments regarding the reviewers' work

6. Proposals for further improvement of the system of training scientific personnel.

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7. The number of dissertations for the degrees of Doctor of Philosophy (PhD), Doctor of Science in the field, broken down by areas of personnel training:

	Specialty 6D060400 – 8D05301 – Physics
1) dissertations accepted for defense (including doctoral students from other universities)	1 (one)
2) dissertations withdrawn from consideration (including those of doctoral students from other universities):	-
3) dissertations that received negative reviews from reviewers (including doctoral students from other universities):	-
4) dissertations with a negative decision following the defense (including doctoral students from other universities)	-
5) dissertations submitted for revision (including doctoral students from other universities)	-
6) dissertations submitted for re-defense (including doctoral students from other universities)	-

Chairman of the dissertation council _____ B.Sh. Shunkeyev

Scientific Secretary of the Dissertation Council _____ Sh.Zh. Sagimbayeva

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