REVIEW

considering a competition for the academic position

“associate professor”

in professional direction PN 4.6. Informatics and computer science (Information technologies),
for the needs of NBU, School of graduate studies, department „Informatics“,
announced in SG no. 26/21.03.2023

The review was prepared by: **Assoc. pr. Dr. Alexander Aleksiev Stefanov – Sofia University, FMI, MRM department, PN 4.5 Mathematics,** in my capacity as a member of the scientific jury for the competition according to Order No. 3-РК-193/ 28.04.2023 of the rector of NBU.

Only one candidate is participating in the announced competition, ch. assistant professor Dr. Stoyan Raykov Mishev. The presented set of documents is complete.

I. Assessment of compliance with the minimum national requirements and the requirements of the New Bulgarian University

The candidate has prepared and submitted a self-assessment reference on the minimum national requirements and the requirements of the NBU, and its content can be summarized as follows:

GROUP A. INDICATOR 1. Dissertation work for the award of the educational and scientific degree PhD

The candidate has defended a doctoral thesis with the title "Correlations in the ground state and structure of low-lying states in odd spherical and transition nuclei" and supervisor Prof. Dr. Viktor Vasilievich Voronov. The dissertation was defended in Dubna, Russia. Documents confirming its legalization and recognition in the Republic of Bulgaria have also been presented. This satisfies the required 50 points for this indicator.

GROUP B. INDICATOR 4. Habilitation work - scientific publications in publications that are referenced and indexed in world-renowned databases with scientific information (Web of Science и Scopus)

As a habilitation thesis, the candidate has submitted 3 publications – one article in Physics Review Letters (Q1) and two publications in conference proceedings (no quartile, SJR). Here,

the quartiles from WoS are correctly used in agreement with ЗРАСРБ. These publications give a total of 135 points out of a required 100.

GROUP Г. INDICATOR 7. Scientific publication in publications that are referenced and indexed in world-renowned databases of scientific information (WoS и Scopus)

A total of 8 articles are presented (no monographs, book chapters, patents, etc. are presented). Publications can be grouped by scientometrics as follows: 2 publications with quartile Q1, 1 publication with quartile Q3, 2 publications with quartile Q4, 3 publications without quartile with SJR. Again, WoS quartiles were used in accordance with the law. That makes a total of 357 points out of 200 needed.

GROUP Д. INDICATOR 11. Citations in scientific publications, monographs, collective volumes and patents, referenced and indexed in world-renowned databases of scientific information (Web of Science и Scopus)

A total of 33 citations with relevant evidence are presented (links to the citing articles). There are no autocitations. All citing articles are indexed in world-renowned databases of scientific information (Web of Science and Scopus). The number of points is 264 with 50 required.

The application documents are well prepared. The full texts of the publications submitted for participation in the competition are also provided.

Based on the above, it is clear that the application **is in accordance** with the minimum national requirements and the requirements of the NBU.

II. Research (creative) activity and results

1. **Evaluation of the monographic work, creative performances or other publications corresponding in volume and completeness to a monographic work, including an evaluation of the scientific and scientific-applied contributions of the author.**

   No monographs or similar works are presented.

2. **Assessment of the contributions in the remaining presented publications**

   The presented publications can be grouped thematically:

   - **Structure of phonon vacuum** – 2 publications where the applicant is the sole author are presented here. Ground states of multiparticle fermionic systems are considered, and the results are compared with models such as the Lipkin-Meshkov-Glick model and the random phase approximation. Numerical methods as well as symbolic calculation software were used to obtain these results. One of the publications is in a journal with Q1 quartile, the other is without quartile with SJR. Since the applicant

is the sole author, there are no questions about his contributions to these works. Both works are written at a high level.

- **Excitation of dipole resonances in atomic nuclei by beta decay of neighboring nuclei** – 2 publications are presented on this topic. One of them is in a journal with quartile Q1, the other Q4. These papers investigate the possibility of excitation of dipole resonances in even-even nuclei (nuclei with an even number of protons and an even number of neutrons) during beta decay of a neighboring odd-odd nucleus (the so-called "pygmy" dipole resonance). A comparison with experimental data from beta decay of isotopes of iodine and xenon is also made. These works are a combination of analytical and numerical calculations. The publications are multi-authored and the applicant has not clearly indicated their contributions to this topic in the reference for scientific contributions. In his defense, in the publications he participates as a second author (authors are not listed alphabetically), which corresponds to a significant contribution.
- **Correlations in ground states and structure of low-lying states in odd-even atomic nuclei** – 4 publications are presented here. They are devoted to an extension of the quasiparticle-phonon model of the atomic nucleus. Again, a combination of analytical and numerical methods is used here. There are two authors, with the candidate being the first author, respectively having the main contribution. The other author is Prof. Voronov – the candidate's scientific supervisor during his doctoral studies. A good impression is made by the fact that they continue their joint scientific activity after the candidate has completed their doctoral studies.
- **Equation of state of infinite nuclear matter** – this topic contains 3 publications, where in all three the candidate is the lead author (in one of them he is the sole author). The articles are devoted to neutron stars - they can be considered as objects composed mainly of nuclear matter. Here the candidate shows flexibility by applying their existing knowledge and skills in quantum mechanics and nuclear physics to neutron star theory. Again, a multi-particle quantum system was modeled, mainly using numerical calculations implemented with the help of graphical processors (video cards). Since the problem allows a high level of parallelization, the use of GPUs is quite justified.

From the presented publications, it is clear that the candidate has serious knowledge and skills in the field of programming and information technology, numerical methods, quantum mechanics and nuclear physics. Modern technologies such as programming with graphics processors are also used. It can be also seen that the candidate is not afraid of analytical calculations. In general, the publications are of a high standard, and the subject matter is complex and difficult to master.

As a criticism, I would note that the reference of the original scientific contributions does not contain exactly and clearly what part of the results obtained is due to the applicant. This is a surmountable problem, as the authors in the submitted papers are ranked by their contributions, and after reviewing the texts it is possible to conclude what merit the applicant has, but this complicates the review process.

3. Citation by other authors

As can be seen from the self-assessment reference, the author has been cited by numerous foreign authors, and the citing articles are in international journals, indexed in world-renowned databases of scientific information. Citing articles can be grouped by scientometrics as follows: 17 citations in journal publications with quartile Q1, 6 in journal publications with quartile Q2, 2 in journals with quartile Q3, 4 in journals with quartile Q4, and 4 with no quartile. The high number of citation articles in quartile Q1 journals is a measure of the quality of the candidate's publications. It is evident that his work is highly appreciated by the international scientific community.

4. Evaluation of the results of participation in research and creative projects and application of the obtained results in practice

In a self-assessment reference for the minimum requirements, the applicant mentions that he has led a project entitled "Astrophysical Constraints on the Neutron Matter Equation of State and Effects Due to Modern Realistic Nuclear Potentials Involving Multinucleon Interactions", Scientific Research Fund, as well as has been involved in numerous other projects.

The topic is mainly of a theoretical nature and the direct application of the obtained results in practice is still a non-trivial task. If the results are confirmed by future experiments, it would aid the development of nuclear technology and our understanding of neutron stars.

In general, I would positively evaluate the candidate's participation in research projects - successfully preparing and leading a scientific project is no easy task.

III. Learning and teaching activity

1. **Auditory and non-auditory activity, work in the electronic training module "MOODLE - NBU", provision of student practices and internships, work with students and doctoral students** – from the self-assessment reference for minimum requirements, it is clear that the applicant takes a large number and variety of courses - from big data, through physics and astronomy, to data forecasting. Some of the courses are designated as practical projects and internships, and the candidate was a scientific mentor to four students under the Student Internships - Phase 1 program. Most of the courses are created by the applicant. The candidate was the supervisor of two bachelor theses (defended with honors), reviewed three theses, and participated as a member of the state examination committee. He is a co-author with a student from NBU in scientific publications. Several students are involved in a project coordinated by him. The reference shows that the candidate has extensive experience in teaching and working with students.

2. **Work with Erasmus students** – the submitted documents do not explicitly mention work with Erasmus students. Some of the courses led by the applicant are in English and it is possible that Erasmus students participate there.
3. **Student survey ratings –** the average rating from student surveys is 4.66 out of a maximum of 5.

From the information provided, I would rate the teaching activity of the candidate as excellent, taking as reference SU "St. Kliment Ohridski" where I am a teacher.

IV. Administrative and public activity

1. **Participation in collective management bodies of the NBU** – the candidate is a member of the Informatics program board.
2. **Public activity –** in the provided documents there is no clear information about public activity.
3. **Attracting students to the program -** As mentioned above, the candidate works actively with NBU students and has been a research mentor to four students in the Student Internship - Phase 1 program. He has supported the participation of several NBU students in schools, practices and scientific visits to CERN, JINR-Dubna, the University of Tübingen. He also has supported the participation of NBU students with oral reports at international scientific forums.

V. Personal impressions of the candidate (if any)
I do not personally know the candidate and have no impressions of him.

VI. Opinions, recommendations and notes on the activity and achievements of the candidate

My overall impressions of the application are quite good. The documents are well-prepared, the applicant has used the WoS quartiles (a fairly common mistake is the use of the Scopus quartiles, the reason being the not very correct wording in the regulations for the application of ЗРАСРБ). The only problem is the lack of a clear formulation of the candidate's merits and scientific contributions in the submitted publications, but this problem can be overcome. A good impression is also made by the variety of topics the candidate deals with - from quantum mechanics, nuclear physics, neutron stars to numerical methods and informatics. Insight into contemporary issues related to these topics requires serious effort and the candidate has done extremely well, which is shown by the high scientometric indicators of the presented publications and the large number of citations.

I have no recommendations for the candidate.

In conclusion, I give my **positive assessment** of the candidature and **recommend** the scientific jury to propose to the competent authority for the selection in the School of graduate studies, NBU to choose **Ch. assistant professor Dr. Stoyan Raykov Mishev** to take the academic position of "associate professor" in professional direction 4.6. Informatics and Computer Science (Information Technology)

Date: 27.07.23г.

Signature ……

/Assoc. pr. Dr. Alexander Aleksiev Stefanov/