STANDPOINT

on the competition for the academic position of "professor" in the professional field 4.5. Mathematics, major in Mathematical Modeling and Application of Mathematics (Monte Carlo and Quasi-Monte Carlo Algorithms and Applications), published in State Newspaper no. 41 / 21.05.2019 for the needs of the Grid Technologies and Applications Department (now High Performance Systems, Networks and Algorithms) of the Institute of Information and Communication Technologies (IICT) at Bulgarian Academy of Sciences (BAS)

by Prof. Dr.Sc. Maroussia Nikiforova Bojkova, Department of Probabilities, Operational Research and Statistics at the Sofia University (SU)-Faculty of Mathematics and Informatics (FMI)

This stanspoint has been written and submitted on the basis of Order No. 178 / 19.07.2019 of the Director of IICT-BAS Prof. D.Sc. Galya Angelova and the decision of the first meeting of the scientific jury on the procedure. It has been prepared in accordance with the requirements of the Academic Staff Development Act (ZRASRB), the Regulations for the implementation of the ZRASRB, the Statute of the BAS, the BAS Act and its Regulations on the conditions and procedure for acquiring academic degrees for occupying academic positions in BAS and Regulations on the specific conditions for acquiring scientific degrees and occupation of academic positions at IICT-BAS.

Associate Professor Dr. Todor Vassilev Gurov is the only candidate in the competition.

1. General description of the competition documents

The set of documents submitted for participation in the competition contains:

- European format of CV;
- A copy of the diploma for the doctoral degree;
- Certificate of Internship in the specialty;
- A list of scientific publications with which the candidate participates in the competition, which do not repeat the ones submitted for the degree of doctor and the academic position of associate professor;
- A list of citations;
- Abstracts of the scientific publications with which the applicant participates in the competition - in Bulgarian and English;
- Copies of all scientific publications with which the applicant participates in the competition;
- A reference for the fulfillment of the minimum national requirements of the IICT under Art. 2b, para. 5, prepared on the basis of documents submitted for the competition;
- Reference to original scientific and applied scientific contributions;
- A declaration that they have not been duly proven plagiarized in scientific works;
- Declarations from project managers to the project manager / contractor;
- A list of competition projects.

2. General characteristics of the submitted scientific works

To participate in the competition for the academic position of "Professor" Assoc. Prof. Gurov presented 26 scientific papers, all of which are visible in the international databases - SCOPUS and / or Web of Science. Of these, a chapter from a book - 1, articles with Impact Factor (IF) - 4, articles with SJR index - 18, as well as articles visible in SCOPUS without SJR Index - 3. All of

these works were published after the competition for Assoc. Prof. (2004) and beyond the "doctor" procedure and are in English.

The submitted scientific works fully meet and even exceed the minimum national requirements (under Art. 2b, para. 2 and 3 of ZRASRB) and also the additional requirements of IICT-BAS for occupation of the academic position of "professor" in the scientific field and professional direction of the competition. Plagiarism has not been identified in the scientific papers presented at the competition.

3. Scientific and applied contributions of the applicant in the submitted publications

The presented scientific publications by Assoc. Prof. Gurov are mainly in the field of Monte Carlo (MC) and quasi-Monte Carlo methods (quasi-MCM) and related applications, which is completely in line with the scientific specialty of the competition. In general, MCMs can be used to solve any problem with a probabilistic interpretation, and this is at the heart of their adequate application in stochastics, in particular. This follows from the Law of Large Numbers when the integrals interpreted as the mathematical expectation of some random variable are approximated by the empirical mean of independent samples of its distribution. MCMs are mainly used in three classes of problems: optimization, numerical integration, and sample distribution generation. In this respect, the main contributions of the applicant can be classified in the following areas:

• Development of new and hybrid MC algorithms for simulating quantum transport and electronic transport in ultra-small devices and development of Grid application SALUTE (Stochastic ALgorithms for Ultrafast Transport in sEmiconductors), by integrating several MC, quasi-MK and hybrid algorithms for solving quantum kinetic equations;

• MK approach to the rendering equation (Cook-Torrance model) and to the estimation (in the sense of approximation / estimation) of densities;

• Investigating the sensitivity of MK and quasi-MK algorithms for solving multidimensional integrals and integral equations with different random number generators and applying techniques to reduce dispersion;

• Investigation of the scalability and energy efficiency of intensive MK and quasi MK algorithms on supercomputer systems for solving quantum-kinetic integral equations on currently available nationally high-performance computing systems (BlueGene / P) and high-performance heterogeneous cluster at IIKT-BAS. Numerical results for parallel efficiency and computational cost are presented.

In general, the publications presented contain new and original theoretical and scientific results in the field of MKM for real-world problems and are of high scientific level. The field of research is wide-ranging and includes the development and improvement of MCMs for solving integrals, integral equations and multidimensional integrals, evaluation of computational complexity, efficient use of modern computing tools (high-performance computer systems, grids, clusters of graphics cards), research and a comparative analysis of the results for the sensitivity indices for different MKM algorithms.

4. Reflection of scientific publications

Associate Professor Dr. Todor Vassilev Gurov enclosed a reference for 174 citations, 74 of which are in journals referenced in SCOPUS and WoS and 100 are in journals referenced in other databases. The Scopus H index of the candidate is 7.

Among the citations are the following: in the volumes of renowned Springer publishers, Lecture Notes in Computer Science series, Springer-Verlag, International Journal of Greenhouse Gas Control, Journal of Computational and Applied Mathematics, Earth Science Informatics, Journal

of Geophysical Research Atmosheres and others. From the above citations, it is evident that the scientific results of Todor Gurov are known to scientists in the field, both at home and in abroad. And the award received at the 30th MIPRO Anniversary Conference, Opatija, Croatia, 2007 is an acknowledgment of the quality of the applicant's research from the international community.

5. Assessment of personal contribution

All the publications presented in the competition are in co-authorship and the candidate is the first author of 5 of them. For the joint articles, I believe that Assoc. Prof. Gurov's contribution is no less than that of the other co-authors. The enclosed documents show that the applicant has participated in 19 international scientific and applied projects, mainly under EC Framework Programs, at 7of which he is a principal investigator (PI) of the Bulgarian team and in 14 national ones, at 7of which he is PI.

6. Critical notes

I have no critical remarks. Rather, I have a recommendation to the candidate in connection with Art. 2, item 5 of the Law of BAS, which concerns the qualification of a leading researcher, namely in his future work to publish on his own, despite the fact that the specifics of the field in which he is working suggests collective work.

7. Conclusion on the application

Having acquainted myself with the materials and scientific works presented in the competition and on the basis of the analysis of their importance and the scientific and applied contributions contained therein, I confirm that the scientific achievements meet the requirements of the ZRASRB, the Regulations to it, the Statute of BAS, the Law of BAS and its Regulations on the terms and conditions for acquisition of academic degrees and occupation of academic positions in BAS and the Regulations on the specific conditions for acquiring scientific degrees and occupation of academic positions at IICT-BAS for occupation by the applicant of the academic position of "Professor" in the scientific field and professional direction of the competition. In particular, the applicant satisfies the minimal national requirements in the professional field to the highest degree and no plagiarism has been detected in the scientific papers submitted at the competition.

I am giving **positive** assessment to the application.

GENERAL CONCLUSION

On the basis of the above, I recommend to the Scientific jury to propose to the Scientific council of IICT-BAS to select Associate Professor Dr. Todor Vassilev Gurov to take the academic position of "Professor" in the professional field 4.5. Mathematics, major in Mathematical Modeling and Application of Mathematics (Monte Carlo and Quasi-Monte Carlo algorithms and applications).

Sofia, 16 September 2019

Sign:

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