OPINION

on a competition for the occupation of an academic position

"Professor"

in the professional field 4.5. Mathematics (Mathematical Logic),

for the needs of Sofia University "St. Kliment Ohridski "(Sofia University),

Faculty of Mathematics and Informatics (FMI),

declared in the State Gazette no. 59 of July 26, 2019 and on the websites of FMI and SU

The opinion was prepared by Prof. Dr. Mat. Sciences Dimitar Ivanov Vakarelov, retired member of the extended staff of the Department of Mathematical Logic and Applications to the Faculty of Mathematics and Informatics of Sofia University "St. Kliment Ohridski" in his capacity as a member of the scientific jury for the competition under Order No РД 38-553 /25.09.2019 of the Rector of Sofia University.

For the participation in the announced competition only one candidate has applied : assoc. prof. Alexandra Andreeva Soskova, Department of Mathematical Logic and Applications at FMI.

I. General description of the materials presented

1. Details of the application

To participate in the competition, the candidate Alexandra Soskova has submitted the following materials:

1. List of the titles of 11 articles to be evaluated for the contest (+ copies of the articles + list of short abstracts of the articles).
2. A list of titles of papers out-of-competition (9 journal articles, + 7 in conference proceedings, + 2 biographical articles, + 11 titles of abstracts, + 2 titles student textbooks).
3. List of Soskova's data from the system "AUTHORS".
4. Information on the minimum requirements for a professor under Art. 2b of the Bulgarian Law on Scientific Degrees and Titles.
5. List of citations of some of the publications.
6. "SPECTRA OF STRUCTURES AND NUMERICAL REDUCIBILITY " - author's description of the scientific contributions and their place in the scientific field.
7. Two recommendations: by Antonio Montalbán, Professor of Mathematics, The University of California, Berkeley, and by Valentina Harizanov, Professor of Mathematics, George Washington University.
8. Other documents (copies of diplomas, communication in the State Gazette, obligatory declarations).

The submitted documents from the applicant comply with the requirements of the corresponding Bulgarian Law on Scientific Degrees and Titles and the Regulations on the

conditions and procedures for acquiring scientific degrees and occupying academic positions at Sofia University “St. Kliment Ohridski ".

2. Details of the applicant

Alexandra Andreeva Soskova graduated with a great success major in mathematics at Sofia University “St. Kliment Ohridski ”and a master's degree in mathematical logic in 1979 with a diploma thesis under the direction of Prof. D. Skordev. She then prepared under his supervision a Ph.D. thesis and defended it in 1990. Since 1996, she has started working at the FMI, passing through the positions of assistant through associate professor.

3. General characteristics of the applicant's scientific work and achievements

Since her graduation Soskova's scientific field has been a theory of computability. In her master thesis ("Some Problems Related to the Definition of Simple Calculus") and the subsequent dissertation ("Effective Algebraic Systems"), this is the field of "Computability in Algebraic Systems", also called "Computability in Abstract Structures", initiated in Bulgaria and led by Prof. Dimitar Skordev. Later, in cooperation with Ivan Soskov and his followers the subject was expanded in accordance with the current state of the theory of computability, reaching the problems of *numerical reducibility* and *spectra of structures*, which are the main topics in the presented works for the competition. This topic is very relevant as the results obtained here place the Bulgarian school of Ivan Soskov and his followers in one of the leading places in the world. The quality and quantity of the results obtained by Alexandra Soskova, both alone and jointly with Soskov and other authors, show that it exceeds significantly the minimum requirements under Art. 2b, para. 2 and 3 of the Bulgarian Law on Scientific Degrees and Titles and the additional requirements of Sofia University “St. Kliment Ohridski "for the academic position of "Professor " in the scientific field and professional direction of the competition. In addition, the candidate's works are after her PhD thesis and the competition for associate professor and there is no proven plagiarism in the scientific works presented at the competition.

4. Characterization and evaluation of the applicant's teaching activity

Soskova reads a number of courses at the Faculty of mathematics and informatics (Master degree cources in Computational Theory, Model Theory; Bachelor degree cources in Mathematical Logic, Logic Programming, Theory of Programs, Semantics of Programming Languages, Discrete Mathematics and Algorithms, Discrete Structures , Languages automata and computability, Computability and Complexity, Mathematical Foundations of Computer Science). In addition, she co-authored two books with Assoc. Prof. Stella Nikolova: "Semantics of Programming Languages" and "Theory of Programs in Tasks". Soskova was the head of two master students and two doctoral students, one of them defended his Ph.D.

5. Content analysis of the applicant's scientific achievements contained in the materials for participation in the competition

As I have mentioned above, Soskova's results are related to one direction of computability theory closely related with the concepts of numerical reducibility and spectra of structures. This direction is clearly described in the text under the title SPECTRA OF STRUCTURES AND ENUMERATION REDUCIBILITY, which contains also the description of her own achievements**.** The introduction part of this text is devoted to a brief description of the direction and the results of Soskowa's papers presented for the competition while the other parts are devoted to a more detailed formulation of these results. It is mentioned here that the Sofia group of the computability theory consider this theory based on partial structures with models of computation based on numerical reducibility and the complexity of the structures to be based on its numerical spectra (the numerical spectra of a denumerable structure is the set of its numerical degrees generated by the representations of the structure in the set of natural numbers). Let us mention that the paper [2] co-authored with M. Soskova can be considered as a quite detailed survey of the recent results of Sofia group of the computability theory. Here one can find a detailed description of: enumeration reducibility, enumeration degree spectra and co-spectra, abstract generalized enumeration reducibilities, jump of a structure, generalized Marker's extensions of sequences of structures. The paper [1] contains a study of the properties of quasi-minimal degrees with respect to the enumeration degree spectra. The papers [3,4,7] are devoted to some generalizations of the notion of spectra: relative spectra of finite sequences of structures, and omega spectra of infinite sequences of structures. The sequence of papers [5,6,8,9,10] is devoted to a study of jump of a structure, jump-inversion theorem and the various applications of this theorem. The collective paper [11] studied various sufficient conditions for structures admitting the so called strong jump-inversion theorem. Here are presented several examples of structures satisfying such conditions.

Let us mention that some of presented papers are with co-authors (7) which do not contain a declaration about concrete authorship of the results. According to the standard practice for such cases I am accepting equal authorship for all of the authors. The scientific results obtained in the proposed 11 papers are at the forefront of results in the field. The interest to these results and particularly to the results of the Sofia group in computability which consists of the followers of their lieder, the late Ivan Soskov, can be seen, for instance from the collective paper [11] which is a result of a joint work of known international experts in the field. Another proof for the interest to Soskowa's results are the two recommendations mentioned above. The recommendation of Anonio Montalban gives a very high evaluation of Jump-invertion theorems published in [5] and [8] which he uses in some of his works (The list of references of Soskowa's works contains 15 references by Montalban). Valentina Harizanov's recommendation can be considered as a detailed review of Soskowa's results and a high evaluation of the achievements of Soskova and Sofia group of computability. Another factor showing high interest to Soskowa's results is the number of citations of her papers (72 of 17 works). The fact that Soskova is a known person in the international logical community can be seen from her participation of numerous international scientific events (64), guest lecturer of various universities and scientific centers (26 for the period 2006-2019), membership of PC (7) and Org. C (5), a membership in international scientific organizations (in "Computability in Europe" since from its beginning in 2008, "Association for Symbolic Logic since 2009, "American Mathematical Society " since 2015, a Chairman of "ASL

Membership Committee since 2018, a member of Consul of ASL for the period 2015-2018, a member of ASL Committee of Logic in Europe for the period 2010-2015).

6. Critical notes and recommendations.

I have no critical notes or recommendations for the papers submitted for review.

7. Personal impressions of the applicant

I have known Alexandra Soskova since she started her master's degree specialization and then as a colleague. She is a kind and helpful person. Following the untimely demise of the leader of the group on computational theory based on spectra theory and reducibility, she actively continued this activity by expanding its collaboration with leading scientists in the field, resulting in, for example, the work on [11] and an impressive number of visiting colleagues from abroad.

8. Conclusion on the application

Having become acquainted with the materials and scientific works presented in the competition and on the basis of the analysis of their importance and the scientific contributions contained therein, I confirm that the scientific achievements meet the requirements of the corresponding Bulgarian Law on Scientific Degrees and Titles , the Regulations for its implementation and the corresponding Regulations of Sofia University “St. Kliment Ohridski “ for the academic position " Professor " in the scientific field and professional direction of the competition. In particular, the applicant meets the minimum national requirements in the professional field and no plagiarism has been detected in the scientific papers submitted at the competition. I give my positive opinion to the application.

II. GENERAL CONCLUSION

On the basis of the above, I recommend that the scientific jury propose to the competent body of choice of the Faculty of Mathematics and Informatics at Sofia University “St. Kliment Ohridski “ to elect Assoc. Prof. Alexandra Andreeva Soskova to take the academic position of “ Professor ” in the professional field 4.5. Mathematics (Mathematical logic).

Sofia, 22-11- 2019

Drafted the opinion:
Prof. Dr. Mat. Dimitar Vakarelov