

## **STATEMENT**

**on a competition for an academic position**

**"Associate Professor"**

**in the field of higher education 4. Natural Sciences, Mathematics and Informatics,  
professional direction 4.5 Mathematics, scientific speciality Geometry  
and Topology (Convex geometry in topological vector spaces),  
for the needs of the Institute of Mathematics and Informatics at BAS,  
announced in SG No. 69 of 11.08.2023 and on the website of IMI-BAS**

The opinion was prepared by: prof. Dr. Sci. Stefan Petrov Ivanov - IMI-BAS, professional field 4.5 Mathematics, scientific specialty "Geometry and Topology" (Differential Geometry), as a member of the scientific jury of the competition in accordance with the Order № 467/10.10.2023 of the Director of IMI-BAS.

Only one candidate has applied for the competition:

Dr. Stoyu Tsvetkov Barov, IMI-BAS.

### **1. General description of the presented materials**

The documents submitted by the candidate in the competition correspond to the requirements of the ZRASRB, PPZRASRB and the Rules for the conditions and procedures for acquiring scientific degrees and occupying academic positions at IMI-BAS (PURPNSZADIMI-BAS).

To participate in the competition, the candidate Stoyu Tsvetkov Barov submitted a list of 17 titles in total, including 17 publications in the most prestigious foreign scientific publications with a high impact factor. A list of citations and other documents (in the form of memos and certificates from the employer, project manager, funding organization or project contractor and other relevant evidence) supporting the applicant's achievements is presented.

### ***2. Brief professional and biographical details of the applicant***

The candidate Stoyu Barov was born on 28.03.1964 in the village of Lesichevo, Bulgaria. He received a Master's degree in Mathematics from the Faculty of Mathematics of Sofia University "St. Kl. Ohridski". He graduated with a degree in Mathematics from "St.

Kliment Ohridski” University of Sofia in 1992. Since 1999 he has been a Ph.D. student at the University of Alabama, USA, where in 2001, he received his Ph.D. in Mathematics from the University of Alabama, USA under the supervision of the famous mathematician Jan Dijkstra. In 1989-1991 he worked as a programmer at the Institute of Informatics, Sofia, 1992-1998 he was a mathematician at the Institute of Mathematics-BAS and also taught at Sofia University. From 1998 to 2001 he was an assistant professor at the University of Alabama, USA, from 2001 to 2004 he was an assistant professor at Ball State University, and from 2004 until now he has been a research fellow at IMI-BAS.

### **3. General description of the candidate's scientific works and achievements**

Dr. Barov's research is mainly in the areas of (geometric) topology, general topology, selection theory, geometric tomography/topology, important and difficult areas of mathematics with possibly significant applications in practice. The candidate's work in Geometric Topology touches areas in Geometric Tomography, Infinite-Dimensional Topology, Measure Theory, Integration Theory, Convex Analysis, Topology of Manifolds. Geometric tomography is closely related to convex geometry in topological vector spaces. I believe that the subject in which Dr. Barov works is one of the most current and challenging areas of mathematics worldwide.

The candidate has submitted 17 scientific publications for the competition, and I will mention publications in world-renowned prestigious journals such as Bull. UMI, Pacific J. Math, J. London Math. Soc., Fundamenta Math., Trans. Am. Math. Soc., Proc. Am. Math. Soc. etc. All the 17 research papers submitted by the candidate do not repeat those of previous procedures for obtaining a research degree and academic position.

No plagiarism has been proven in the scientific works submitted to the competition.

The submitted scientific works satisfy the minimum national requirements (according to Article 2b, paragraphs 2 and 3 of the RASRB) and, accordingly, the additional requirements of IMI-BAS for holding the academic position "associate professor" in the scientific field and professional direction of the competition.

### **4. Characteristics and evaluation of the candidate's teaching activity**

The candidate has extensive teaching experience in Bulgaria and in the USA. He has taught courses in Analysis 1 and 2 at Sofia University, Application of Differential Equations, Analysis and Algebra at the University of Alabama, Discrete Mathematics, Analysis 1 and 2,

Applied and Business Analysis, Mathematics and Applications, Linear Algebra at Ball State University.

### **5. Analysis of the applicant's scientific and scientific-applied achievements contained in the materials for participation in the competition**

Geometric topology/tomography is related to finding important characteristics of a given object in a given space, having information about the projections of this object on planes. This is closely related to reconstructing a body from x-rays. The problem of finding information relevant to the object based on its projections in small-dimensional spaces is extremely important not only in mathematics but also in many fields of science, for example medicine, etc.

In my opinion, the main contribution of the candidate is contained in the article [10] published in TAMS. It suffices to mention the result that if the projections of a nonconvex closed subset of the  $n$ -dimensional flat space are convex and essential with respect to an open subset of the Grassmann manifold (that is, the set of all  $k$ -dimensional linear subspaces of the  $n$ -dimensional flat linear space provided with the Hausdorff metric) from projecting directions, then the non-convex closed subset contains an open copy of the  $(n - k - 1)$ -manifold.

I will also note the candidate's results in [2], where the claim of H. Schmidt, namely that every Hausdorff HS-space is a T3-space is discussed. In this work a wide class of spaces containing all Hausdorff spaces of countable character is defined where the Schmidt's conjecture holds and a necessary and sufficient condition of this statement is formulated. It turns out that Schmidt's statement is not true in the general case, so these results in the positive aspect of the question remain valid.

The quality of his work is evidenced by the corresponding numerical indicators: Dr. Barov has submitted 17 publications for the competition that have not been part of his previous academic procedures. Six of his papers were published in **Bull. UMI, Pacific J. Math, J. London Math. Soc. Fundamenta Math., Trans. Am. Math. Soc. Proc. Am. Math. Soc.** which are world renowned reputed journals in mathematics. The 17 citations of the competition papers as well as a list of 5 research grants received, of which 3 abroad, and 3 research awards received abroad for his research achievements are presented.

### **6. Conclusion on the application**

Having read the materials and scientific works submitted in the competition and based on the analysis of their significance and the scientific and applied contributions contained

therein, **I confirm** that the scientific achievements meet the requirements of the Law on Research and Development, the Regulations for its application and the relevant Regulations of IMI-BAS for the appointment of Dr. Stoyu Barov to the academic position of “Associate Professor” in the professional field and scientific area of the competition. In particular, the candidate satisfies the minimum national requirements in the professional field and no plagiarism has been found in the scientific works submitted for the competition.

I give my **positive assessment** to the application.

## **II. GENERAL CONCLUSION**

On the basis of the above, **I recommend** the scientific jury to propose to the competent body for the selection of IMI-BAS to elect Dr. Stoyu Tsvetkov Barov to occupy the academic position of "Associate Professor" in the professional field 4.5. Mathematics in the scientific specialty "Geometry and Topology" (Convex geometry in topological vector spaces).

03.11.2023 г.

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(Prof. Dr. Sci. Stefan Ivanov )