OPINION

by assoc. prof. Ivan Minchev,
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on a competition for the academic position associate professor in the area of higher education 4. Natural sciences, Mathematics and informatics; professional direction 4.5. Mathematics; scientific specialty Geometry and topology (Homogeneous spaces and the geometric invariant theory), published in the Bulgarian state newspaper no. 65/02.08.2024 г.,

This opinion was prepared by assoc. prof. Ivan Minchev from the Department of mathematics and informatics, Sofia University “St. Kliment Ohridski”, as a member of the scientific Jury for the competition in professional direction 4.5. Mathematics, scientific specialty Geometry and topology (Homogeneous spaces and the geometric invariant theory) in accordance with the Order № 347/01.10.2024 of the Director of IMI-BAS.

The only candidate to apply for the position is **Valdemar Tsanov, PhD**.

General description of the submitted materials

The documents submitted by the candidate satisfy the requirements imposed by the Bulgarian Law and also the Regiment of the Bulgarian Academy of Sciences concerning the procedures for promotions and assumption of Academic position at the Academy.

The candidate Valdemar Tsanov, PhD, submitted for this competition a list of 10 titles, as follows: a habilitation thesis from the Ruhr-University Bochum; 5 papers that are published in journals with impact factor, of which one is with

quartile Q1, two are with a quartile Q2, one is with quartile Q3, and one is with quartile Q4. The remaining 4 papers are published in journals without impact factor, of which two are in a journal with SJR, and 2 are in indexed journals. The scientific works presented by the candidate do not repeat those submitted for previous competitions or promotions. There are no indications for any existence plagiarism in the scientific papers submitted for the competition. All the documents are presented in accordance with the low and show without any doubt that the candidate fulfils all the requirements of the low for acquiring the academic position associate professor.

The submitted documents describe in detail the candidate's research and teaching activities. These documents represent a strong evidence that Valdemar Tsanov has developed rich and ample scientific and teaching activities, and has obtained significant mathematical results satisfy the requirements imposed by the Bulgarian Law, and respectively by the additional requirements of the Bulgarian Academy of Sciences, for assumption of the academic position of associate professor.

Candidate's Bio

The candidate Valdemar Tsanov, PhD, obtained his Master's degree in Mathematics at Sofia University "St. Kliment Ohridski" in 2006 under the supervision of Petko Nikolov. The title of his thesis was "Geometry of toric knots". Between 2007 and 2011 he was a PhD student at the Queen's University, Canada, with advisor Ivan Dimitrov. He received his PhD in 2011. The title of his dissertation theses is "Embedding of flag manifolds and cohomological components of modules". In 2020, he receives a habilitation from the Ruhr-University, Bochum. Between 2011 and 2023 he is working as a researcher at the Goettingen University, Rohr-University Bochum and Jacobs University Bremen. Since 2023 the candidate is a researcher at the Bulgarian Academy of Sciences – Institute of Mathematics.

The research interests of Valdemar Tsanov, PhD, are mainly in the area of Lie theory and more specifically the geometry of flag varieties and the geometric invariant theory.

Outline of the Candidate's scientific results and achievements

The candidate has conditionally grouped the scientific publications presented in the competition into several thematic areas, as follows:

- Geometric invariant theory and flag varieties;
- Universal tensor categories and tensor modules of infinite dimensional Mackey Lie algebras;
- Three dimensional geometry and theory of knots.

Publications [2] -- [9] are devoted on the first thematic area; [10] – on the second, and [1]– on the third.

The majority of the presented papers are related to investigations concerning the geometry of homogeneous complex projective varieties, the structure and the representation theory of their respective symmetry groups and the related invariant theory. The obtained results here split into two specific topics, which are intertwined in a natural and productive way.

The first topic is concerned with the degrees of generating invariant polynomials on a linear irreducible representation of a connected complex semisimple Lie group and the related geometry of orbits in the respective projectivized representation space.

The second topic is concerned with embeddings of reductive groups and the study of invariants of subgroups in an irreducible representation of the ambient group. The approach here is based on the Geometric Invariant Theory applied to the action of the subgroup on the flag variety of the ambient group.

I would like to mention here an interesting result obtained by the candidate in collaboration with A. Petukhov (publication [3]) that gives a classification of all equivariantly embedded homogeneous projective varieties whose rank function is lower semi-continuous. The result gives a list of all irreducible representations of reductive groups, for which the corresponding rank function is lower semi-continuous.

The quality and the quantity of the scientific research of Valdemar Tsanov are in accordance to the requirements imposed by the Bulgarian Law, and respectively by the additional requirements of the Bulgarian Academy of Sciences, for assumption of the academic position of associate professor.

Conclusion about the Candidate

Having read the documents submitted by PhD Valdemar Tsanov for the competition, and based on the analysis of their importance and the research advancements of the candidate, I confirm that the scientific achievements of scientific satisfy the requirements of the Bulgarian Law, as well as the Regiments of the Bulgarian Academy of Sciences, for promotion to the academic position of a Professor in the Scientific Area of Natural Sciences, Mathematics and Informatics, and Professional Direction of the competition, 4.5. Mathematics, scientific specialty Geometry and topology (Homogeneous spaces and the geometric invariant theory).

I recommend approving the application of Valdemar Tsanov, PhD, for the position.

Date: 17.11.2024 Member of SC:

(Ivan Minchev)