R E P O R T

on the competition for academic position "Associate Professor"
in professional field 4.5. Mathematics, scientific specialty "Geometry and Topology",
for the needs of the Institute of Mathematics and Informatics
at the Bulgarian Academy of Sciences,
announced in SG, issue 65/ 02.08.2024

This report is prepared by **Prof. Ludmil Katzarkov** from the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences, as a member of the Scientific Jury.

Only one applicant has submitted documents for participation in the announced competition: **Valdemar Vasilev Tsanov**, **PhD**, currently a researcher at the Institute of Mathematics and Informatics.

I. Analysis of the applicant's career profile

According to the submitted CV, the applicant received his PhD at Queen's University under the supervision of Ivan Dimitrov, who in turn was a PhD student of Ivan Penkov - a world leader in the area of representation theory. Penkov comes from an amazing linege of Manin's students including Beilnson, Drinfeld, Tschinkel, Kontsevich, Manin. After that Tsanov was a postdoc in Bochum where most of his work was produced. In the last two years Tsanov was working in Sofia.

II. Evaluation of the scientific papers of the applicant for the overall academic development

The research interests of Tsanov's are in the field of representation theory and algebraic geometry of smooth manifolds with additional structures. The main scientific results of the applicants are in three directions:

1. GIT for flag varieties.

2. Tensor categories

3. Representation theory invariants or 3 dimensional manifolds.

GIT for flag varieties:

In a series of papers Tsanov studies the connection of the nonstable GIT manifolds and the geometrically characterized submanifolds in the quotients.

This is a classical question in GIT theory.

Tsanov continues in studying the connection between special sets of the image of the moment map with and the geometrically characterized submanifolds in the quotients.

Some intriguing results were obtained. They improve our understanding of nonstable GIT manifolds and the geometrically characterized submanifolds in the quotients. These results go far beyond the classical resuts by Landsberg and Manivel.

Tsanov has shown very good knowledge of many areas in modern mathematics, such as:

a) Representation theory

b) Algebraic Geometry

c) Topology

d) Group actions

e) Moment maps

Tsanov combines all these areas in a very imaginative way.

Tensor Categories:

Tsanov continues the studies of the universal Makey Lie tensor categories initiated by Ivan Penkov. A surprising full clasification is obtained - this is a seminal work.

Representation theory invariants or 3 dimensional manifolds:

In a series of highly technical works Tsanov recovers the complement of a knot in terms of the ring of classical modular forms. In these works Tsanov demonstrates immense technical skills.

III. Reflections of the applicant's publications.

According to the documents submitted by the applicant he has publications mainly in foreign journals.

IV. Evaluation of the teaching activities of the applicant.

The applicant has done some teaching in Germany.

V. Critical remarks and recommendations

I have no significant remarks to the documentation presented for the competition. The documents and the necessary references submitted by the applicant are prepared precisely.

VI. Overall evaluation of the application

After my careful and critical reading of the documentation and the publications presented for the competition and my analysis of their significance, I confirm that the scientific contributions of Valdemar Tsanov meet the minimal national requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its application, and the Rules for the conditions and regulations for acquiring scientific degrees and occupying academic positions in the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences for occupying the academic position **"Associate Professor"**.

VII. CONCLUSION

Based on the above, I give my **positive evaluation** for the application and recommend **Valdemar Vasilev Tsanov** for the **Associate professor** position in the Institute of Mathematics and Informatics most enthusiastically in the highest possible terms.

November 17, 2024 Referee: .....

(Prof. Ludmil Katzarkov)