

Review

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For the documents presented for participation in the competition for Associate Professor in the scientific field 4.5. Mathematics, subject Equations of mathematical physics

According to the order № 29/19.02.2021 of the Director of IMI-BAS which I received via e-mail on 5.03.2021, I was appointed as a member of the scientific jury in the competition for associate professor, announced in DV iss. 108/22.12.2020 for the Institute of Mathematics and Informatics – BAS with the only candidate principal assistant professor dr. Tihomir Ilchev Valchev.

On 1.03.2021 I received via e-mail the following documents of the candidate in the competition:

1. Application
2. Declaration (form 4.2)
3. Declaration (form 3.2)
4. List of publications for the competition
5. Full list of publications of the candidate
6. List of citations for the competition
7. Full list of citations
8. CV
9. List of the projects of the candidate
10. Certificate from IMI-BAS for the internship
11. Original contributions of the candidate
12. Announcement of the competition
13. Abstracts of the publications in English and in Bulgarian.

I realized that these documents are not the full documents required for participation in the competition. Such documents as certificates for M.Sci. and Ph.D., table with filled minimal requirements of IMI and the copies of the publications for the competition were missing. After my signal for missing documents on 2.03.2021 I received a link with all documents (at the moment I am writing this review the link is missing). I received CD with the documents which was not readable. Finally, I received USB with the materials of the competition. I think that all these are irregularities of the competition.

A. Short biography of the candidate

Principal assistant professor Dr. Tihomir Valchev obtained his Bachelor degree in Theoretical physics at the Physical Faculty of Sofia University in 2002. In 2003 he graduated as M.Sci. at the same faculty. In 2007 he obtained Ph.D. in the subject 01.03.01 Theoretical and mathematical physics with scientific advisor Prof. Vladimir Gerdjikov. As it can be seen from the diplomas candidate Dr. Tihomir Valchev has both degrees M.Sci. and Ph.D. in the scientific field Physics, but the competition is in the scientific field Mathematics.

After the check at NAOA it is clear that his Ph.D. is in the scientific subject Theoretical and mathematical physics which is accredited in the scientific field Physics. After check at NACID I could not find the candidate in Mathematical sciences. I want to point out that the competition is in the scientific field 4.5 Mathematics for the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences.

From 2004-2009 Tihomir Valchev worked as physicist at the Institute for nuclear investigations and nuclear energetics, Bulgarian Academy of Sciences. From 2009-2014 he worked as principal investigator at the same institute. From 2012-2014 he was post doctor at Dublin Institute of Technology, Ireland.

In 2015 he moved in the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences without competition according to the rules of the institute.

I noticed that Dr. Valchev does not have any teaching activities. There are no teaching textbooks written by him.

B. General description of the presented materials at the competition

According to the law for the development of academic personal of the Republic of Bulgaria candidate should satisfy minimal requirements which can be proved with a table (Form 2.2) of IMI-BAS. I shall make comments in details on this table which was presented by the candidate. In the group B the minimal requirements should be 100 points and he covers exactly 100 points. In the group G I noticed some incorrectness- SJR of all publications is taken for year 2019, not for the year of publication. The paper Valchev, T. and Yanovski, A., Solutions to a Vector Heisenberg Ferromagnet Equation Related to Symmetric Spaces, In: Proceedings of XXth International Conference on Geometry, Integrability and Quantization, June 2-7, 2018, Varna, Eds.: I. Mladenov, V. Pulov and A. Yoshioka, Avangard Prima, Sofia, 2019 after check in Scopus was written as published in Geometry, Integrability and Quantization, 2019, 20, pp. 285–296. This leads to misunderstanding and difficulties of reviewing. The paper Gerdjikov, V. S., Grahovski, G. G., Mikhailov, A. V., Valchev, T. I., Rational Bundles and Recursion Operators for Integrable Equations on A.III Symmetric Spaces, Theoretical and Mathematical Physics, 167 (3) (2011) 740-750 has Q4 rang for Mathematics, not Q3 as it is written in the table. For this reason I do not accept

what is written in the table for these two papers. The requirement is to have 220 points and the candidate has a little bit above.

In the group E in the table is written that the candidate participated in international project, which after the check is really individual post doc fellowship which is not international project. I do not accept 20 points for this. He pretends that he is the leader of the project of National Science Foundation, but the facts are different. The leader of this project in 2016 was prof. Horozov, and in 2019 he was substitute as a leader by the candidate. For this reason I accept only 5 points for the 1 year leader of the project. In connection with the obtained funds of the project he wrote that he obtained 120 000 lv. But this is not true since in this project the funds are obtained by prof. Horozov in the beginning, Dr. Valchev only is spending these money since 2019. For this reason I do not accept 24 points for funds. Totally he has only 5 points in the group E and he needs 20 points in order to cover the minimal requirements.

I am surprised that the commission checking the documents with order 31/24.02.2021 did not checked correctly the table.

According to my check Dr. Tihomir Valchev does not cover minimal requirements for this competition.

I shall analyze the documents which according to the table cover the minimal requirements, more precisely the publications and citations.

The candidate presented 15 publications for the competition from which paper [1] is not published yet and I do not consider it for review.

The publications can be classified in the following way:

Type

- Published papers – 8
- Reports – 6

Significance

- Papers in journals with IF – 7
- Papers in journals with SJR- 7

Place of publication

- Papers in refereed international journals -8
- Reports in the proceedings of international conferences in Bulgaria -6

Language

- English -14

Number of the co-authors

- Single author -6
- One co-author - 4
- Two co-authors - 1
- Three and more co-authors – 3

C. Citations

- Total – 28
- From Bulgarian authors -17
- From foreign authors -11
- Cited papers – 9

Here I would like to point out that from 28 citations presented at the competition 18 are from his co-authors – Gerdjikov and Yanovsky. After check at the system SONIX of IMI-BAS I realized that only 6 citations are there after he came to IMI-BAS.

D. Total characteristics of the candidate's activities

1. Teaching activities

From the documents in the competition and according to his CV it is clear that Dr. Tihomir Valchev does not have any teaching activity. He have never worked with students, Ph.D. students. He did not write any textbook. This is weak side of the candidate.

2. Scientific and applied activities

Publications with which he participates in this competition are mainly in physical journals. After I read the papers I think that they have more impact in physics than in mathematics. From the reference of his scientific contributions is clear that the papers of Dr. Tihomir Valchev are in the field of theory of continuous integrable systems. Main part of the papers study analogous to the Heisenberg ferromagnet equation. I shall consider shortly these papers.

Paper [2] studies equation of Heisenberg ferromagnet type. Some special solutions associated with four distinct discrete eigenvalues of scattering operator are presented. For this purpose dressing method is applied. Here I would like to point out that this method is very old from the 70s of last century which can be seen from the references. Moreover, there is no theorem proved in the paper, and the competition is in Mathematics. Analogous results are obtained in the papers [3]. [4]. In the papers [5,6] an auxiliary spectral problem is considered, for which expansions over the eigenfunctions of recursion operators are constructed. Here again the old dressing method is applied. Via this method the results are illustrated on the example of the generalized Heisenberg ferromagnet equation. The only theorem in these papers is without proof. In paper [7] quadratic bundles related to Hermitian symmetric spaces are considered. The author discussed how one can apply Zakharov-Shabat's dressing procedure to derive reflectionless potentials obeying zero boundary conditions. Again the theorem is

without proof. Paper [8] deals with the construction of rational type solutions to multicomponent nonlinear evolution equations solvable through inverse scattering transform. The method is based on the dressing technique of Zakharov-Shabat. No theorems in the paper. In paper [9] a generalization of the notion of reduction group is proposed which provides group-theoretical tools to study in a uniform way certain classes of nonlocal S-integrable equations. The main results are presented on 3 examples, but without any theorem. Paper [10] is in fact report at the conference in which the spectral properties of scattering operator are discussed and the direct scattering problem associated with it is developed stressing on the effect of reduction on these. By applying of Zakharov-Shabat's dressing procedure it is demonstrated how one can obtain reflectionless potentials. There are two theorems without proofs. In paper [11] the dressing method is adapted for quadratic bundles which allows to find special solutions to multicomponent derivative Schrödinger equation. This paper is presented by his co-author Yanovsky. No theorems again. Paper [12] deals with Heisenberg ferromagnet equation. The spectral properties of the scattering operator are studied and fundamental analytic solutions in terms of Volterra integral equations are constructed. Main method is dressing method. No theorems in the paper. In paper [13] using the dressing method two classes of soliton solutions associated with the Lax operator are constructed. Briefly, the Hamiltonian structures of these generalized multi-component Heisenberg ferromagnetic type integrable models are analyzed. No theorem in the paper. In paper [14] the authors analyze and compare methods for constructing the recursion operators for a special class of integrable nonlinear differential equations related to symmetric spaces of the type A.III. No theorems in the paper. In paper [15] a class of integrable nonlinear differential equations related to the A.III-type symmetric spaces is studied. The symmetries of the Lax operator are inherited by the fundamental analytic solutions and give a characterization of the corresponding Riemann–Hilbert data. No theorems in the paper.

I would like to mention the following things concerning the papers: some equations as Heisenberg ferromagnetic are considered and for their investigation the old dressing method is applied which from the 70s of last century. The main disadvantage from mathematical point of view is that the main results are not formulated in Theorems with proofs.

E. Critical Remarks

Since I have many critical remarks I shall systemize them as follows:

- The documents for the competition are prepared very badly;
- There are no proofs of the presented materials as links to the papers and data bases;
- There is no list of the reports at the conferences;
- The table of the application 2.2 for the minimal requirements is filled misleadingly and without proofs of the information as it is required from IMI-BAS for participation in the competition for associate professor;
- The information concerning the projects is not true and de facto the minimal requirements in this group are not satisfied;

- The papers for the competition are monotonous and the results are not formulated in theorems as it should be done in Mathematics;
- The dressing method applied in all papers is old from 70s of last century;
- The citations are mainly from his co-authors which shows that his results are not known in the international society;
- There is not teaching activity and the candidate never worked with students and Ph.D. students.

Shortly the preparation of the candidate for the competition is carelessly and is offending to the members of the scientific jury.

F. Personal impressions

I know Dr. Tihomir Valchev since 2014 when he asked me to come in our department of Differential equations and mathematical physics when I was head of the department. He took part 3 time in the conference NTADES which I organize every year. His reports at the conference were not interested for the foreign and Bulgarian participants. It was clear that he participated because of the publications in the proceedings of the conference. As it can be seen from the list of publications, 3 of them are published in the proceedings of NTADES.

He does not participate in the scientific activities of the department. He is not integrated in it and does not have any joint publication with the members of the department. Moreover, he was elected for the secretary of the department but he did not manage to do this job and I substituted him with another colleague.

Conclusion: According to all I stated above I give **negative estimate** to principal assistant professor Dr. Tihomir Ilchev Valchev and I do not recommend him for associate professor in the scientific field 4.5 Mathematics, subject Equations of mathematical physics. He does not cover the minimal requirements of IMI-BAS for such position, he does not have achievements in mathematics and shows carelessness in the preparation of the documents for the competition.

14.04.2021

Reviewer:

(Prof. D.Sci. Angela Popivanova)