

REVIEW

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On the documents submitted for a participation in the competition for an occupation of the academic position “Associate Professor” at the Faculty of Mathematics and Informatics at Sofia University St. Kliment Ohridski on **Research area: 4.** Natural sciences, mathematics and informatics, **Professional field 4.5.** Mathematics (Mathematical analysis), announced in the State Gazette no. 30 of 15.04.2022 and on the web site of the Sofia University St. Kliment Ohridski, where Nikolay Antonov Ivanov, PhD an Assist. Prof. from Sofia University St. Kliment Ohridski participates as a candidate – **the only one** candidate.

By Order №ПД-38-286/14.06.2022 of the Rector of the Sofia University St. Kliment Ohridski, I was appointed as a member of the Scientific Jury of the competition for the occupation of the academic position “Associate Professor” in on Research area: 4. Natural sciences, mathematics and informatics, Professional field 4.5. Mathematics (Mathematical analysis).

As a member of the jury I, obliged to write a review, have received all the necessary documents attached to the application of Assist. Prof. Nikolay Antonov Ivanov, PhD to the Rector of the Sofia University St. Kliment Ohridski for participation in the competition. The documents are well designed and arranged.

For the participation in the announced competition **just one candidate** (Assist. Prof. Nikolay Antonov Ivanov, PhD) has submitted documents. He has enclosed a reports to satisfy the minimum national requirements. The Faculty of mathematics and informatics at Sofia University St. Kliment Ohridski has no additional requirements for an occupation of the academic position “Associate Professor”. The candidate has presented a diploma for a PhD degree, obtained in 2007 at Texas A&M University and a certificate №165-12.04.2010 from the Higher Attestation Commission (VAK).

The candidate has received his PhD in 2007, thus he satisfies the minimum national requirements and has a score of 50 points for the group of indicators “A”. The PhD thesis is registered in NACID with the scientific indicators

The candidate has been an Assistant Professor consecutively since October 2015 at the University of Veliko Tarnovo St. Cyril and St. Methodius University of Veliko Turnovo” and from October 2016 until now at Sofia University “St. Kliment Ohridski”.

The applicant has presented three papers indexed in WoS with Q1, one with Q2 and three indexed in Zentralblatt and/or MathSciNetc (one of the articles is to appear, but its points are not needed for the satisfaction of the minimum national requirements), thus he satisfies the Law on the Development of the Academic Staff in the Republic of Bulgaria of a group of indicators "B" -111 points and of a group of indicators "Г" -210 points.

The Assist. Prof. Nikolay Antonov Ivanov enters the competition with 8 citations from the WoS and/or SCOPUS database, thus he satisfies the Law on the Development of the Academic Staff in the Republic of Bulgaria and therefore satisfies the requirement of a group of indicators “Д” is 64 points.

This short and formal review shows that all minimum national requirements and the additional requirements of the Faculty of Mathematics and Informatics are met.

ОБЩА ХАРАКТЕРИСТИКА НА ДЕЙНОСТТА НА КАНДИДАТА

ОЦЕНКА НА УЧЕБНО-ПЕДАГОГИЧЕСКАТА ДЕЙНОСТ

Assist. Prof. Nikolay Antonov Ivanov, PhD, was born in 1977, completed his master's degree at Sofia University “St. Kliment Ohridski” in 2001 majoring in Mathematics (Mathematical Analysis) and obtained PhD Degree in 2007 at Texas A&M University. The candidate has been Assist. Prof. consecutively since October 2015 at the University of Veliko Tarnovo “St. St. Cyril and Methodius” and from October 2016 until now at Sofia University “St. Kliment Ohridski”. From the reference for classroom and out-of-classroom employment, it appears that the applicant’s hours are substantially above the required norm.

I do not know the candidate personally. I attended the report of Nikolay Antonov Ivanov at the Spring Scientific Session of FMI at SU 2021 and I was impressed by the candidate’s ability to present the results in a language understandable to the audience.

EVALUATION OF SCIENTIFIC AND SCIENTIFIC-APPLIED ACTIVITIES

I divide the applicant's scientific contributions into two areas:

- 1) A simplicity and uniqueness of trace for reduced free products of finite families of finite dimensional C*-algebras with specified traces on them.
- 2) Group C*-algebra of group amalgamation and of HNN-extensions

The C*-algebras of the form $\begin{pmatrix} p & 1-p \\ C \oplus C & C \\ \alpha & 1-\alpha \end{pmatrix} * \begin{pmatrix} q & 1-q \\ C \oplus C & C \\ \beta & 1-\beta \end{pmatrix}$ are characterized in

[J. Anderson B. Blackadar U. Haagerup, *Minimal Projections in the Reduced Group C*-algebra of $Z_n * Z_m$* , *J. Operator Theory*, **26**, 1991, 3-23]. In [1] are characterized

the algebras of the form $\begin{pmatrix} p_0 & p_i \\ A_0 \oplus \left(\bigoplus_{i=1}^k M_{m_i} \right) & \alpha_i \\ \alpha_0 & \alpha_i \end{pmatrix} * \begin{pmatrix} q_0 & q_i \\ B_0 \oplus \left(\bigoplus_{i=1}^l M_{m_i} \right) & \beta_i \\ \beta_0 & \beta_i \end{pmatrix}$ and necessary

and sufficient conditions for the simplicity and uniqueness of the trace for reduced free products of finite families of finite dimensional C*-algebras with specified traces on them, connected with the parameters $\alpha_i, \beta_i, p_i, q_i$ are obtained. The main result in [1] extends the obtained in [K. Dykema, *Simplicity and Stable Rank of Some Free Product C*-Algebras*, *Trans. Amer. Math. Soc.* 351, No. 1, 1999, 1-40] results. The obtained results solves the open problem proposed in the above mentioned publication. In publication [1] a structural theorem for reduced free products of finite dimensional C*-algebras is proved, which generalizes the known up to now results, where the structure only of the reduced free products of finite dimensional abelian C*-algebras was known.

Group C*-algebra of group amalgamation and of HNN-extensions are investigated. The publications in this area are [4,5,6,7]. A main contribution in these studies is the introduction of quasi-kernels, with the help of which necessary and sufficient conditions for C*-simplicity and C*-algebras, that are not simple, but have unique traces [4,6]. A new characterization is found for a free product of groups with amalgamation to have a simple reduced C*-algebra in [4]. The results are illustrated with examples. A nondegenerate free products with amalgamations are studied in [4]. Several equivalent conditions for G to be a C*-simple are obtained. In [4, Theorem 5.9] a necessary and sufficient condition for a degenerate amalgam G to be C*-simple is obtained. It is shown that there exists a radical class of groups for which the reduced group C*-algebra of any group is simple if and only if the group has a trivial radical corresponding to this class. Some results for actions of free products with amalgamation are obtained. In [6] are studied non-ascending HNN extensions acting on trees. A characterizations of C*-simplicity and the unique trace property with the help of kernel and quasi-kernel, generated by the HNN extensions is obtained. The

results are illustrated by examples. In [6, Theorem 4.10] is presented a sequence of equivalent conditions for a non-ascending HNN extension to be a power group and C^* -simple. The unique trace property of the trace for HNN extensions is studied. Some generalizations are obtained, concerning C^* -simplicity of groups admitting extreme boundary actions. In publication [6] are investigated the properties Powers group, слаби Powers group, weak* Powers group and strong Powers group and their characterizations. Wide classes of groups amalgamations and HNN-extensions are investigated in [5,7] similar to those from publications [4,6]. The investigated classes satisfy the unique trace property. Sufficient conditions for the investigated groups to be C^* -simple are found. Illustrative examples are presented that are generated by generating relations, which allows the study of their other properties as well. A condition that ensures not inner amenable of the presented examples is found in [5]. A relatively wide, simple, normal subgroups are pointed in the illustrative examples in [5]. In publication [2] are investigated classes of C^* -algebras, generated Toeplitz operators. It is proven that these classes are separable, kernel, simple, pure infinite and satisfy the universal theorem of the coefficients. The K -theory of the investigated class of C^* -algebras is found and it is proven that they are isomorphic to the tensor product of C^* -algebras of Cuntz. In publication [3] are studied noncommutative instantons and ADHM construction, connected with them. These constructions are used widely in physics. The author has tried to fill the gap of the physics literature by presenting a mathematically correct definitions and results. An equivalent form of the ASD equations is obtained and the topological index of the noncommutative ADHM instantons is computed.

A good impression is made by the presence of a report at the Fields Institute and the fact that he regularly participates in the Spring Scientific Session of the FMI at SU.

From the WoS and SCOPUS databases, it can be seen that the author's citations are from colleagues from universities all over the world, indicating that the research topic is of interest to a wide range of scientists and teams.

I have not found "plagiarism" in the works of the candidate in the sense of the "Law on the Development of the Academic Staff in the Republic of Bulgaria" in the Republic of Bulgaria.

CRITICAL NOTES

Some of the documents: CV (the title and the PhD thesis and the scientific adviser are missing), the reference for classroom and extracurricular employment (it is not clear what subjects to what specialties he taught over the years), the reference to the originality of the scientific contributions (with so many and interesting results obtained, one of the publications is 48 pages, it was possible to note a lot more results in the reference or in the summaries), the list of the scientific reports (it should accompanied with titles and places) are presented in a simple form. The results obtained by the candidate are impressive and I am convinced that his development will not stop after getting the academic position of “Associate professor” and I recommend that the documents for the next procedures in which he participates be more comprehensive.

CONCLUSION

In my opinion the candidate Assist. Prof. Nikolay Ivanov has obtained enough results both in quality and quantity (quantity should be assessed not only in number of articles and sum of points but also in terms of pages and obtained results). The presented documents meet the requirements, conditions and criteria of the Law on the Development of the Academic Staff in the Republic of Bulgaria, Rules for applying of the mentioned above law, Rules for the conditions and order for acquiring academic degrees and academic positions at Sofia University “St. Kliment Ohridski” to occupy the academic position “Associate Professor”. Therefore, I give my **strictly positive assessment and I recommend to the Scientific Jury to prepare a report-proposal to the Honorable Scientific Council of the Faculty of Mathematics and Informatics for the election of Assist. Prof. Nikolay Antonov Ivanov, PhD for the academic position “Associate Professor”** in the Sofia University “St. Kliment Ohridski” in Research area: 4. Natural sciences, mathematics and informatics, Professional field 4.5. Mathematics (Mathematical analysis)

10.08.2022
Plovdiv

Signature:
/Prof. Boyan Zlatanov, PhD/