# Opinion

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According to the competition for the academic position of "associate professor" at the Institute of Mathematics and Informatics, BAS, scientific direction 4.5 Mathematics,

announced in the State Gazette, no. 8/26/01/2024

**1. Contest details.**

The competition was announced by IMI-BAN in the State Gazette 8/26.01.2024. Documents were submitted by one candidate - Asen Georgiev Chorbadjiev, assistant at IMI-BAN. The set of documents submitted by the only candidate for the competition is complete. The scientific jury for the selection competition was selected by the National Assembly of IMI and was appointed by order 64/21.03.2024 of the Director of IMI.

**2. Applicant data.**

Asen Georgiev Chorbadjiev graduated from higher education (master's degree) in 2006 at the Faculty of Physics of the "St. Kliment Ohridski" University, majoring in "Engineering Physics". He obtained his PhD in High Energy Physics at the Institute for Nuclear Research and Nuclear Energy, where he held the position of "physicist". Since 2015, he is the assistant at the Institute of Mathematics and Informatics of the BAS.

**3. Description of scientific results.**

The candidate submitted 18 publications for participation in the competition. All of them are in the world information databases, admissible for this scientific direction. It should be noted that the applicant also has publications not indexed in the information bases.

Two main directions in the candidate's scientific interests can be distinguished: statistical modeling of various geophysical phenomena and statistics of branching stochastic processes.

In the field of statistical modeling of geophysical processes, the candidate presents 10 articles ([1]-[7], [9], [10],[18] in the list of publications included in the competition). For the most part, these works are the result of the candidate's participation in teams of scientists investigating the relevant phenomena.

In the field of branching stochastic processes, the candidate has included 8 publications in the competition. The main theoretical results in these works present the study of various Markov branching processes.

The work [8] is focused on the influence of the initial conditions on the development of a branching process, in the case when they follow precisely defined probability distributions. This topic is further developed in [12], where a birth-death process with random initial conditions is considered.

In the period of the COVID-19 pandemic, the considered models are adapted to model the development of the number of infected people in the population. A significant advantage is the ability to examine the impact of random initial conditions in the early days of the pandemic as a result of migration factors. The results in this direction were used to model the behavior of the pandemic, and were published towards the end of the pandemic period in a publication [17].

In the publication [12], research in the field of branching processes is continued with the study of a continuous-time Markov process with a geometric distribution of successors. A solution of the inverse Kolmogorov equation in the pre-critical and critical cases is derived. The conditional marginal distribution of the process is the pre-critical case. Work [15] continues research in this direction.

For the implementation of a large part of these studies, numerical simulation methods have been developed, together with relevant software. The paper [16] presents a package implemented in R for the simulation and parameter estimation of branching processes, which implements the branching process approach in previous publications.

**5. Approbation of scientific contributions.**

The applicant has submitted a list that contains 15 citations. Of them, 7 are on works included in the competition procedure. Some of the publications have been presented at various scientific forums.

The authorship of the publications is as follows: 2 are independent, 8 are with one co-author and 8 are with more than one co-author. I consider the applicant's contribution to the joint publications to be equal to the contributions of the co-authors. I have not noticed any signs of plagiarism and self-plagiarism.

**6. Teaching and participation in projects.**

In the documents submitted by the applicant, I did not find any information about a teaching. Evidence of participation in three projects is presented. Two of them are financed by the National Research Fund of the Ministry of Education and Science, and one is internal institutional.

**7. Conclusion.**

On the basis of the materials submitted by the candidate for the competition, described above, as well as the fact that they meet the minimum national requirements and those of IMI-BAN for occupying the academic position of "associate professor" in scientific field 4. Natural sciences, mathematics and informatics, professional direction 4.5. Mathematics, I propose that Asen Georgiev Chorbadjiev be elected to the academic position of "associate professor", with a scientific specialty "Theory of Probability and Mathematical Statistics".

Sofia,

10.05.2024 г.

assoc. prof. Dimitar Atanasov