OPINION

on the competition for the academic position of "Associate Professor" in the field of higher education 4. Natural Sciences, Mathematics, and Informatics, professional direction 4.5. Mathematics, scientific specialty "Equations of Mathematical Physics" (Mathematical Modeling in General Relativity and Quantum Physics) for the needs of IMI-BAS, announced in State Gazette issue 82/27.09.2024

This opinion is prepared by: Assoc. Prof. Dr. Galin Nikolaev Gyulchev – Faculty of Physics, Sofia University "St. Kliment Ohridski", professional direction 4.5. Mathematics, scientific specialty "Equations of Mathematical Physics" (Mathematical Modeling in General Relativity and Quantum Physics), in his capacity as a member of the academic committee for the competition, as per Order No. 435/26.11.2024 of the Director of IMI-BAS.

The only candidate who has submitted documents for participation in the announced competition is Dr. Hamed Ahmad Pejhan, a researcher under the National Scientific Program "PICOM" at IMI-BAS.

I. General Overview of the Submitted Materials

The documents submitted by the candidate meet and even exceed the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), its Rules of Implementation (RIDASRBA), and the Rules of IMI-BAS for acquiring academic positions and scientific degrees.

For participation in the competition, Dr. Hamed Pejhan has submitted a list of 12 publications in journals with impact factor rankings as follows: Q1–10, Q2–2. Three of these were published during the candidate's work on his doctoral dissertation titled "Krein quantization approach to vacuum energy", defended in 2015 at Azad University, Tehran, Iran. The complete list of works includes 21 publications in reputable impact factor journals, 2 conference proceedings, and 1 book titled *"The de Sitter (dS) group and its representations: an introduction to elementary systems and modeling the dark energy universe",* republished by Springer Nature in 2024. A list of 17 citations of the competition-related works is provided, with a total of 28 citations.

1. Brief Professional and Biographical Information about the Candidate

Dr. Hamed Pejhan was born on March 21, 1983, in Iran. In June 2007, he graduated with a Bachelor's degree in Physics from Urmia University. In September 2010, he obtained a Master's degree in Mathematical Physics from Azad University, Tehran, Iran. In September 2011, he began his doctoral studies at the same university and defended his dissertation titled *"Krein quantization approach to vacuum energy"* in August 2015.

Dr. Hamed Pejhan is an established researcher (R3 category) with extensive academic and scientific experience. Since May 2023, he has been a postdoctoral researcher at IMI-BAS. Before that, from September 2021 to April 2023, he worked as an independent researcher at Azad University (Science and Research Branch) in Tehran, Iran. From April 2018 to August 2021, he held a postdoctoral position at Zhejiang University of Technology in Hangzhou, China. Previously, from September 2015 to March 2018, he was a postdoctoral researcher at Azad University, Tehran, Iran.

Dr. Pejhan is a reviewer for prestigious scientific journals such as International Journal of Modern Physics D and International Journal of Theoretical Physics. His contributions have been recognized with the "Distinguished Young Researcher" award (Azad University, 2016) for outstanding scientific achievements and his admission to the doctoral program under the "Outstanding Talent" category.

2. Analysis of the Candidate's Scientific and Applied Achievements

Dr. Hamed Pejhan's research focuses on quantum systems in de Sitter (dS) spacetime and their description through projective unitary irreducible representations of groups, following Wigner's concept. The main directions of his research include covariant quantization of the graviton field in de Sitter spacetime, the study of extended symmetry structures including conformal symmetry, and the investigation of the vacuum energy problem in the context of Krein space quantization. Among his contributions are the development of a covariant and infrared-free formulation of the graviton two-point function, the expansion of symmetry frameworks for describing de Sitter spacetime, and the application of Krein space structure to address anomalies in quantization and vacuum energy studies. His research also offers novel approaches for modeling a small but non-zero cosmological constant within the Krein–Gupta–Bleuler quantization framework, which is crucial for understanding dark energy.

The high numerical indicators of his presented publications testify to the quality of his work. The candidate has submitted three thematic groups of publications, encompassing 9 articles published in prestigious journals such as *Physical Review D, Physics Letters B, The European Physical Journal C, Annals of Physics,* and *International Journal of Theoretical Physics.* These works address contemporary issues in theoretical physics, such as vacuum states of gravitons and Casimir effects in de Sitter spacetime, and offer original solutions to problems in quantum gravity and mathematical physics. The total impact factor of the articles published after obtaining the PhD degree exceeds **37**, with a total page count of **110**. Dr. Pejhan has provided evidence of **17 independent citations** of his works, and his *h*-index is **6**, according to Scopus.

Dr. Pejhan is also a co-author of the book *"The de Sitter (dS) group and its representations: an introduction to elementary systems and modeling the dark energy universe",* published by Springer in 2022.

The submitted publications exceed the minimum national requirements (under Art. 2b, paras. 2 and 3 of ADASRB) as well as the additional requirements of IMI-BAS for the academic position of "Associate Professor" in the scientific field and professional direction of the competition.

No evidence of plagiarism in the submitted scientific works has been established.

3. Characterization and Evaluation of the Candidate's Teaching Activities

According to the documentation submitted for the competition, the candidate has not engaged in teaching activities.

4. Critical Remarks and Recommendations

I have no critical remarks or recommendations.

5. Personal Impressions of the Candidate

I do not know Hamed Pejhan personally.

6. Conclusion on the Candidacy

After reviewing the submitted competition materials and scientific works, and based on the analysis of their significance and scientific and applied contributions, **I confirm** that the scientific achievements meet the requirements of ADASRB, its implementing rules, and the corresponding

rules of IMI-BAS for Dr. Hamed Pejhan to occupy the academic position of “Associate Professor” in the professional direction and scientific field of the competition. Specifically, the candidate meets the minimum national requirements and the additional requirements of IMI-BAS in the professional direction, and no plagiarism has been identified in the submitted scientific works.

I give my **positive** evaluation of the candidacy.

II. OVERALL CONCLUSION

In light of the above, **I confidently recommend** that the academic committee propose to the competent authority of the Institute of Mathematics and Informatics at BAS to elect Dr. Hamed Ahmad Pejhan to the academic position of “Associate Professor” in the professional direction 4.5. Mathematics, scientific specialty “Equations of Mathematical Physics” (Mathematical Modeling in General Relativity and Quantum Physics).

Date: 24.01.2025 **Prepared by:**……

(Assoc. Prof. Dr. Galin Gyulchev)