

# STATEMENT

by Assoc. Dr. Eng. Margreta Parashkevanova Vasileva

from Medical University "Prof. Dr. Paraskev Stoyanov", Varna, member of the Scientific Jury of the competition for the academic position "Professor" in "Biomedical Techniques and Technologies" in the field of higher education 5. "Technical sciences", professional direction 5.2. "Electrical engineering, electronics and automation" Medical University "Prof. Dr. Paraskev Stoyanov", Varna announced in SG No. 102/23.12.2022

Regarding: the candidacy of Assoc. Dr. Eng. Kristina Stanimirova Bliznakova from the Department of Medical Equipment, Electronic and Information Technologies in Healthcare, MU-Varna

## 1. General characteristics of the candidate's research activity

The candidate in the competition for the academic position "Professor" Kristina Stanimirova Bliznakova has submitted information about her research and applied activities through a reference, according to Art. 2b of Law for Development of the Academic staff in Bulgaria for the fulfillment of minimum national requirements for occupying the academic position "Professor" in the field of higher education "5. Technical Sciences".

Of the presented works in the current procedure, 11 peer-reviewed scientific publications in English, referenced in the international SCOPUS database, are included, 6 of which are in Q1, 4 in Q2, and 1 in Q4 (indicator B – 143.84 items), 27 peer-reviewed scientific publications (26 in English, 1 in Bulgarian) and a published chapter of a book, of which 16 are referenced in the international database SCOPUS (index D – 229.28 items). There are a total of 17 citations for the competition (index D - 170 items). In Group E, 8 research projects are presented, 4 of which are under the leadership of Prof. Bliznakova.

Beyond the minimum requirements, 5 scientific peer-reviewed publications indexed by SCOPUS are listed.

## 2. Educational and teaching activity

Assoc. Prof. Dr. Kristina Bliznakova is a leading teacher of the following BSc and MSc disciplines: "Radiological Physics", "X-ray Technology and other Imaging Techniques", "Programming in C++", "Programming", "Introduction to the programming of C/C++" and "Applied Simulation Products in Health and HealthCare" and is part of the teaching teams of the disciplines "Digital Health Technologies" and "Innovations and Technologies in Health Care". Since 2015, Prof. Bliznakova has been a lecturer within the European Training and Education for Medical Physics Experts Network, as well as in the National Center of Radiobiology and Radiation Protection. She also develops editorial and reviewer activities.

### **3. Basic scientific and scientific-applied contributions**

The scientific and scientific-applied contributions of the candidate are summarized as:

- development of a new method for creating an anthropomorphic computational model of the mammary gland for radiological purposes;
- creation of new methods for obtaining computer models of tumor formations with irregular shape and different density, based on breast tomosynthesis and breast computer tomography and based on mathematical description;
- development of a new method for studying X-ray refractive indices of materials for 3D printing for the purpose of preparing physical models of the mammary gland for phase-contrast imaging diagnostics;
- creation of a new algorithm for the implementation of mammary gland tomosynthesis;
- introducing a new technique for lung diagnostics using a dark field;
- construction of a new classification of anthropomorphic computer models of the mammary gland and tumor formations;
- creation of a new computational approach for studying the available 3D materials for the production of a four-component anthropomorphic mammary gland phantom;
- determining suitable materials for 3D printing to create anthropomorphic radiological phantoms;
- development of a new method, based on an ink-jet printer for creating a physical radiological model of a mammary gland;
- creation of new physical radiological mammary phantoms without lesions created with 3D printers;
- development of a new method for printing 3D lesions for applications related to mammary gland imaging;
- development of new and validated methods for creating a physical radiological phantom of a mammary gland from patient images obtained with a dedicated computed tomography and magnetic resonance tomography;
- creation of new methods and related techniques for phase-contrast mammary gland tomosynthesis;
- development of software platforms for virtual clinical research of new methods and related technologies for diagnosis and screening of the mammary gland;
- Creation of a software platform for feature extraction from medical images.

### **4. Significance of contributions to science and practice**

The international projects with the participation of Associate Professor Bliznakova have a beneficial impact on the practical developments at the Medical University - Varna and on the development of new interdisciplinary scientific directions. The projects are mainly under

international grant schemes - H2020, FP7 EURATOM and Marie Curie Grants, as well as under national competitions - National Innovation Fund, Scientific Research Fund, OP "Innovations and Competitiveness" and Fund "Science". The funds raised for projects managed by the candidate are over BGN 2 million.

Prof. Bliznakova has a published patent application to the Bulgarian Patent Office: "Method and device for creating inhomogeneous anthropomorphic physical models suitable for X-ray imaging" 111540/25.07.2013, as well as a recognized patent application from the Patent Office of the Republic of Greece: System and method of material identification and visualization using multi energy x-ray imaging, published: 05.05.2016.

The results of the conducted scientific research are available to the specialists from the candidate's publication activity.

The submitted documents for participation in the competition meet the quantitative indicators of the criteria for occupying the academic position of "Professor".

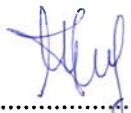
#### **5. Notes and recommendations**

I have no critical remarks about the candidate. I would advise the candidate to continue her successful work in the field of computer modeling and simulations in the field of breast imaging and her teaching activity in the field of Biomedical engineering and technology.

#### **CONCLUSION**

Based on the presented scientific works, their significance, the scientific, scientific-applied and applied contributions contained in them and the results from the points obtained for the groups of indicators, according to Art. 2b of the Law on the Development of the Academic Staff in Bulgaria, I propose to award the academic position "Professor" to the Associate Professor Dr. Eng. Kristina Stanimirova Bliznakova in the specialty "Biomedical Engineering and Technologies", professional direction 5.2 "Electrical Engineering, Electronics and Automation", for the needs of the Department of Medical Equipment, Electronic and Information Technologies in Healthcare, Medical University-Varna.

20.04.2023

Member of Scientific Jury:  .....

(Assoc. Prof. Dr. Eng. Margreta Vasileva)