

ERA Chair VIBraTE

Junior Postdoctoral Researcher – Applied Mathematics or Engineering

The Horizon Europe ERA Chair VIBraTE is currently seeking a highly motivated and skilled postdoctoral researcher to join our research team in the field of **applied mathematics**. The successful candidate will work with a team of interdisciplinary researchers to develop mathematical models, analytical tools, and numerical simulations to study the interaction of brain-computer interface (BCI) implants with brain tissue. A brain-computer interface (BCI) is a technology that collects brain signals and transmits them to an external device that outputs commands. Insight into the interaction between BCI implants and the brain tissue will help maximize the potential of the technology.

Location

Sofia, Bulgaria

Responsibilities:

- Develop and implement mathematical models and methods to analyze complex systems
- Conduct numerical simulations and data analysis to validate and refine the models
- Collaborate with other researchers within the project to achieve the goals and deliverables
- Present research findings at international conferences and publish research papers in high-impact journals
- Contribute to the dissemination and outreach activities of the project, including organizing workshops and engaging with stakeholders

Qualifications:

- Ph.D. in Mathematics, Engineering, or a related field
- Strong background in applied mathematics, with expertise in at least one of the following areas: Finite Element Modelling, numerical analysis, optimization
- Proficiency in programming languages, such as MATLAB, Julia, or Python
- Experience in computer algebra systems, such as Maple or Maxima
- Experience in interdisciplinary research and working in teams
- Excellent written and oral communication skills in English
- Demonstrated ability to publish research papers in international peer-reviewed journals

- Ability to work independently and guide junior members of the team
- An advantage is having a residency in an EU Member State.

We offer:

- A competitive salary according to the Marie Curie European standards
- An international and dynamic research environment
- Access to state-of-the-art facilities and equipment
- Opportunities for professional development and career advancement

This is a full-time position for one year (12 months), with the possibility of an extension until the end of the project (Jan 2028) based on the performance of the candidate. The position is available from 1st Jan 2024, and applications will be reviewed on a rolling basis until the position is filled.

Application

We look forward to receiving your application and will screen it as soon as possible. To apply, please submit a

- cover letter (max 2 pages)
- CV, including up to 3 topically-relevant publications
- 2 letters of recommendation
- 3-minute video pitch in English

Other achievements, such as open source code repositories, public datasets, can also be indicated if available.

The applications will be evaluated by an international hiring panel. Shortlisted candidates will be invited to an interview and may be asked to give a research presentation.

Applications should be sent to Tsvetelina Yorgova : tsvetelina.yorgova@iict.bas.bg

About the project

ERA Chairs are funded by the European Union to support the development of research excellence in specific scientific areas. The objective of the ERA Chair project is to attract and maintain high-quality researchers at the host institution, improve research quality and impact, and enhance the institution's research environment. The project provides funding for research projects, mobility opportunities, and training activities for researchers.

The Neurotechnology lab was established in 2023 as part of the VIBraTE Chair at the [Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences](#). Among the objectives of the lab is to model and investigate the **properties, geometry, and mechanical effects of the interaction of the brain with the implanted**

electrodes. The immediate axes of the project of the Neurotechnology Laboratory are described in engineering terms, however, the global perspective is to develop academic knowledge and research in the communication between brain and machine. A strong integration of engineering and biomedical expertise is thus expected. Beyond a mere collaboration between different disciplines, this project will encourage engineering/mathematics candidates to familiarize themselves with biomedical research, including hands-on experiences to gain a more complete view of the issues. Working on the ‘brain-machine interface’ must lead to expertise bridging disciplines in the rapidly developing field of bioengineering. This is a major challenge that offers future collaborators to the VIBraTE project a unique opportunity to contribute to some of the most active fields in science.

The research objectives of the VIBraTE Chair are situated along the following research axes:

- Axis 1: Viscoelastic coupling between implants and the brain
- Axis 2: Optimization of the interface geometry of implants
- Axis 3: Diffusion phenomena in the brain tissue
- Axis 4: Effects of viscoelastic deformations on modeled brain activity

This position will focus on Axis 1 and 2, i.e. to experimentally investigate the influence of the implant’s geometry and properties on the bio-mechanical interaction with the brain tissue.