



**Offer #2024-07516**

## **Post-Doctoral Research Visit F/M Experimental study of electrical impedance tomography in the context of electrocardiography**

**Contract type :** Fixed-term contract

**Level of qualifications required :** PhD or equivalent

**Fonction :** Post-Doctoral Research Visit

**Level of experience :** From 3 to 5 years

### **About the research centre or Inria department**

The Inria center at the University of Bordeaux is one of the nine Inria centers in France and has about twenty research teams.. The Inria centre is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative SMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute...

### **Context**

The project context revolves around the detection of cardiac arrhythmias, specifically ventricular fibrillation, which is responsible for the vast majority of the 350,000 sudden cardiac deaths occurring annually in Europe. One of the most promising recent approaches to detecting these cardiac rhythm disorders is electrocardiographic imaging (ECGi), currently under study at IHU-Liryc. It is a non-invasive imaging technique that reconstructs the heart's electrical activity based on electrical measurements taken on the patient's chest using a vest adorned with numerous electrodes, commonly referred to as the "vest." However, current ECGi resolution techniques do not allow for sufficiently accurate reconstruction of cardiac electrical activity for complex clinical cases. In particular, it is widely accepted that uncertainties in organ and chest movement, as well as inter-individual variations in tissue conductivities, play a role in the loss of ECGi precision.

To improve ECGi resolution, it is therefore necessary to propose more comprehensive descriptions of electrical properties within the chest volume and enhance the information obtained from measurements on the vest. We propose using Electrical Impedance Tomography (EIT) for this purpose: it is a non-invasive technique for reconstructing internal conductivities as well as shapes. Although currently commonly used for medical purposes, it has not yet been applied to the detection of cardiac rhythm disorders. The objective of this project is to validate EIT resolution methods through experiments conducted at IHU-Liryc, using an experimental setup developed there for ECGi.

### **Assignment**

The postdoc will be supervised by Laura Bear, a researcher in the Signal Processing team at IHU-Liryc and Lisl Weynans. He/she will work directly with Laura Bear, and in this context, will aid in experimental preparations in the laboratory, develop the signal processing pipelines to process raw data, evaluate available EIT methods to determine organ conductivities and position within the torso. In a second stage, the post-doc will help develop and validate experimentally a coupled EIT-ECGi approach to reconstruct cardiac electrical activity, and in doing so identify the key parameters of influence on the electrical propagation within the torso.

### **Main activities**

Signal processing, experimental studies, potentially modeling

### **Skills**

Knowledges: Basic knowledge of any of the following would be a plus: impedance spectroscopy, finite element models, model fitting, cardiac electrophysiology, inverse problems

Expertise, know how: Programming in MATLAB and basic signal processing

Soft skills: teamwork, communication

## Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of partial teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities

## Remuneration

grossly remuneration (before deduction of social contributions and income tax ) : 2788€ / month

## General Information

- **Theme/Domain** : Modeling and Control for Life Sciences  
Instrumentation et expérimentation (BAP C)
- **Town/city** : Talence
- **Inria Center** : [Centre Inria de l'université de Bordeaux](#)
- **Starting date** : 2024-06-01
- **Duration of contract** : 2 years
- **Deadline to apply** : 2024-05-10

## Contacts

- **Inria Team** : [CARMEN](#)
- **Recruiter** :  
Weynans Lisl / [Lisl.Weynans@inria.fr](mailto:Lisl.Weynans@inria.fr)

## About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

**Warning** : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

## Instruction to apply

Please sending :

- CV with List of publication
- Cover letter
- Support letters (mandatory)

### Defence Security :

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

### Recruitment Policy :

As part of its diversity policy, all Inria positions are accessible to people with disabilities.