

Methodological developments in micro-MRI and NMR spectroscopy

Presentation of the University of Rennes

Rennes, the capital city of Brittany, represents an ideal place to work and live. Rennes is an attractive and dynamic city, and it offers a perfect balance between professional and personal life. Rennes universities are in the center of the territorial dynamic and provide 9.400 jobs on the territory. It is also an actor in the innovation ecosystem. Rennes ranks second in the best student towns list.

The University of Rennes gathers different parts of educational facilities, research poles and five "grandes écoles" that participate in the elaboration and implementation of the strategy of the University of Rennes: École des hautes études en santé publique (EHESP), École nationale supérieure de chimie de Rennes (ENSCR), École normale supérieure de Rennes (ENS Rennes), Institut national des sciences appliquées de Rennes (INSA Rennes), Sciences Po Rennes.

The University of Rennes also associates with the University of Rennes 2, the École nationale de statistique et analyse de l'information de Rennes (ENSAI) and the Institut Agro Rennes-Angers to develop shared projects.

The national research organisms - CNRS, INRAE, Inria, Inserm - and the university hospital of Rennes participate as elaboration and implementation partners for the scientific strategy of the University of Rennes. The University of Rennes has 37.200 students, 4.500 associate professors, researchers, administrative and technical workers and 34 labs spread on 9 campuses.

Contract characteristics

Wanted affectation date for the post: 2024

Duration of the contract: 24 months

Full-time contract

Gross monthly wage: from 2250€ to 2500€ (depending on diplomas and experience)

Working place: Rennes, University of Rennes, Villejean Campus, UAR Biosit, PRISM platform.

Description of the service and place of the agent in the organization

(mission of the unit, supervisor, environment, constraints)

The recruited research engineer will be attached to the UAR Biosit, that manages 14 platforms including the Research in Multimodal Imaging and Spectroscopy Platform PRISM, (<https://www.pf-prism.org/>), which offers imaging and spectroscopy tools for a large range of applications, from the biomedical sector to food-processing and chemistry. PRISM has 4 Magnetic Resonance imagers (MRI 1.5T, 7.4T, 7T and 11.7T), 2 high-field NMR spectrometers (2 x 500MHz) and 6 relaxometers (0.35T and 0.47T). PRISM is part of the Western French network of technological platforms for environment and life sciences Biogenouest (<https://www.biogenouest.org/>) and the national research structure "France Life imaging". Prism was certified ISO 9001 in 2015.

The candidate will integrate the PRISM platform, particularly the Bio-SCANS department on the Rennes University Villejean site, with strong interactions with the Agro-SCANS department in UR OPAALE, INRAE. The candidate will work on a project that aims to develop new methods both in MRI and NMR spectroscopy, with the micro-imaging probe of the PRISM platform. This double-approach will benefit from the already existing expertise and skill for these two modalities (imaging and spectroscopy) on the platform, in the biomedical field (Bio-SCANS) and material science (Bio-RMN and Agro-SCANS).

Missions and activities

Mission: The engineer will conduct research in MRI, principally at 11.7T on an NMR spectrometer equipped with a micro-imaging probe:

- for the *in vitro* and *in vivo* study of animal models such as Zebrafish, complex cellular systems (organoids, 3D cultures) or for the *ex vivo* study of fresh or fixed tissues
- for the study of bio sourced gels based on polysaccharids (starch, arabinoxylanes) or protein (corn zein) in order to conceive bio polymer matrices with controlled functionalities allowing, for example, the liberation of active principles initially contained in these matrices.

This research work contains several interconnected contributions:

WP1: Elaboration of experimental set-ups adapted to the study of multicellular systems, and zebrafish larvae.

WP2: Validation of the sequences adapted to the study of multicellular systems, zebrafish larvae and tissues. Adaptation of the protocols for the *in vivo* imaging of the zebrafish.

WP3: Optimization of the study of dynamic monitoring of functional bio sourced matrices. Implementation of the study of dynamic monitoring of functional bio sourced matrices.

The candidate will need an ability to imagine and conceive experimental plans adapted to the study of multicellular systems, zebrafish larvae (WP1) and hydrogels whose shape/form evolves through time (WP3). The candidate will carry the realization of the experiments with the MRI (WP2 and WP3), their interpretation and traceability, from data to analysis reports, and their valorization in communications in conferences and articles in scientific journals.

Required skills

Knowledge:

- Solid knowledge in NMR and/or MRI
- Knowledge in signal and images
- Appetence for methodological development and development of experimental set-ups
- Autonomy, rigor and aptitude for group work
- Knowledge of English
- A driving license will be appreciated as the position may require moving between sites.

Expertise:

- Experience with Bruker imaging and spectroscopy software's
- Skills in image analysis tools
- Skills in programming will be appreciated
- Communication
- Multidisciplinary and collaborative work
- Writing reports and funding requests
- Scientific and technological watch and monitoring
- Knowledge of the ISO9001 standard

Soft skills :

- Organization
- Rigor
- Autonomy
- Good relations
- Reactivity

Formation

- Required education: PhD
- Speciality: PhD in chemistry or physics or image/signal processing or biological and medical engineering

Experience

- Experience in the MRI field and possibly in NMR spectroscopy.
- Driving license appreciated/if possible

Contact and application

Applicants must send a CV to Pierre-Antoine Eliat (pierre-antoine.eliat@univ-rennes.fr) and Corinne Rondeau (corinne.rondeau@inrae.fr)