2018-01215 - Post-Doctoral Research Visit F/M Postdoc position in stochastic systems biology

Type de contrat : CDD ou Mobilité IT
Contrat renouvelable : Oui
Niveau de diplôme exigé : Thèse ou équivalent
Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex, LabEx, IRT, Equipex) and partner of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge; safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 450 researchers and engineers from Inria and its partners who work in the research centre's 31 teams, the 100 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Île-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

Contexte et atouts du poste

We are looking for a postdoc to work on an interdisciplinary French-Austrian project that is a collaboration with the group of Calin Guet at IST Austria. The goal of the project is to make use of a recently developed unique experimental platform (Chait et al., Nature Communications, 8(1):1535, 2017) to construct hybrid synthetic genetic circuits consisting of real biological parts and of virtual parts that only exist in the form of computational models.

Work environment:

Our group, InBio, is a joint initiative between Inria Saclay – Ile de France and Institut Pasteur. Inria is the French national institute for research in computer science, control, and applied mathematics promoting scientific excellence and technology transfer. The Pasteur Institute is a non-profit private foundation dedicated to biomedical research and the fight against infectious diseases.

InBio is an interdisciplinary research group, combining experimental and theoretical biology in the same lab. We combine systems and synthetic biology approaches with control and active learning methods and stochastic and statistical modeling frameworks. Our main long-term goal is to develop a comprehensive methodological framework supporting the development of a quantitative understanding of cellular processes. The group consists of scientists with diverse backgrounds (mathematics, physics, computer science, biology) and nationalities. The spoken language is English. We have a “wet” lab as well as a “dry” lab, both located on the Institut Pasteur campus in the heart of Paris.

Mission confiée

The Project:

Quantitative and synthetic biology live in a state of quiet denial: while the analogy of genetic to electronic circuits is commonly invoked and depicted, we routinely fail to make predictions about network dynamics from “known” properties of the network’s components that would agree with the data at the level expected in physics or engineering. Without composability, one must model and understand every network from scratch, even if it is assembled from known parts—a bleak prospect for the future of quantitative biology.

Inspired by recent developments in the nascent field of cybergenetics, the goal of this project is to construct hybrid “bio-digital” genetic circuits in order to approach questions in systems and synthetic biology from an entirely new angle. Biological and digitally modeled circuit parts will be connected through real-time optogenetic stimulation of individual cells. Hybrid circuits will be used for two purposes: (i) to replace single components of biological circuits by computational models in order to better understand them, (ii) to create virtual contexts for (parts of) biological circuits and to study how the circuit interacts with these contexts.

Links: https://www.nature.com/articles/s41467-017-01683-1

Principales activités

This is a research position on the theoretical and methodological aspects (see keywords below) of the described project. The project will start 2019 and end 2022.

Keywords: stochastic chemical kinetics, stochastic processes, Bayesian inference, control theory, synthetic genetic networks, single-cell data, optogenetics

Avantages

- Subsidised catering service
**Partially-reimbursed public transport**
**Social security**
**Paid leave**
**Flexible working hours**
**Sports facilities**

**Rémunération**
2653 € brut mensuel
2653 € gross salary per month

**Informations générales**
- **Thème/Domaine**: Modélisation et commande pour le vivant
- **Ville**: Paris
- **Centre Inria**: CRI Saclay - Île-de-France
- **Date de prise de fonction souhaitée**: 2019-04-01
- **Durée de contrat**: 1 an
- **Date limite pour postuler**: 2019-03-31

**Contacts**
- **Equipe Inria**: LIFEWARE
- **Recruteur**: Ruess Jakob / jakob.ruess@inria.fr

**A propos d'Inria**

Inria, l’institut national de recherche dédié aux sciences du numérique, promeut l’excellence scientifique et le transfert pour avoir le plus grand impact. Il emploie 2400 personnes. Ses 200 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3000 scientifiques pour relever les défis des sciences informatiques et mathématiques, souvent à l’interface d’autres disciplines. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 160 start-up. L’institut s’efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l’économie.

**L'essentiel pour réussir**

Candidates should have a PhD in a theoretical field, such as mathematics, physics, computer science, control engineering or similar, and be capable of using methods from these fields to study dynamical systems and stochastic processes in applications. Any further experience with continuous-time Markov chains, stochastic differential equations, or stochastic chemical kinetics is a plus. Candidates who expect to finish their PhD-studies in the near future are also encouraged to apply.

Candidates must be capable of working together with scientists from diverse disciplines and be able to work together with biologists to devise, implement, and parametrize mechanistic models of synthetic genetic circuits. Experience in working with single cell microscopy data or dynamical models of gene expression is a plus.

Scientific curiosity and the drive to depart on a project that intends to explore an entirely new scientific direction will be necessary.

Applications should include a CV, list of publications, and contact details of scientists willing to recommend the candidate.

**Consignes pour postuler**

- CV
- Cover letter
- Letter(s) of recommendation, where applicable

**Sécurité défense**:

Ce poste est susceptible d’être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L’autorisation d’accès à une zone est délivrée par le chef d’établissement, après avis ministériel favorable, tel que défini dans l’arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l’annulation du recrutement.

**Politique de recrutement**:

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.

**Attention**: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d’autres canaux n’est pas garanti.