

Post-doctoral position : Modeling the coupling of mammalian circadian clock to metabolism, with application to metabolic diseases

CONTEXT

The team of Marc Lefranc at PhLAM laboratory develops mathematical models to understand the dynamics of the circadian clock, which synchronizes to the day/night cycle to provide an internal measure of time, and orchestrates numerous biological events in living systems. We work on data-driven models, in close collaboration with biologists, but try to keep them as simple as feasible, in order to better capture design principles and core players of the clock dynamics.

SUBJECT

We seek a post-doctoral researcher to design mathematical models of how the mammalian circadian clock synchronizes to metabolism and understand how disruptions in this pathway, such as caused by nutritional stress, lead to diseases such as diabetes. A first model of the liver clock synchronized to feeding/fasting cycles via intracellular factors NAD⁺ and AMP has been obtained, and has been published in Cell Reports (Woller et al, Cell Rep 17, 1087, 2016). We plan to extend it and to apply it to other tissues such as muscle, skin or adipocytes. Research will be conducted in close collaboration with the groups of Bart Staels and Hélène Duez at the European Genomics Institute for Diabetes (EGID) in Lille, an internationally leading center in the study of metabolic diseases.

PROFILE

Candidates are expected to have a good background in nonlinear dynamics and/or applied mathematics as well as in computational and mathematical biology, in the context of cellular regulatory networks, but candidatures with a more biological background and a good modeling experience will also be considered. A significant programming experience is also required (preferably C/C++ or similar languages under a linux environment). Since the candidate will interact closely with our collaborators, and with experts in biophotonics or microfluidics, excellent communication skills and a capacity to work in an interdisciplinary environment, as well as a familiarity with cellular biology are required.

APPLICATION

The contract is for 1 year, but is renewable twice. The monthly net salary (after social security taxes but before income tax) is about 2200 euros. Candidates should send as soon as possible a cover letter stating their motivations and CV to Marc Lefranc (marc.lefranc@univ-lille1.fr). They should also arrange for two reference persons to send simultaneously recommendation letters.

WHERE

On the Science and Technology campus of the largest French University, the University of Lille, in the north of France. Lille is the core of the 4th urban area in France (1.2 M people) and is connected by high-speed trains to Brussels (40 min), Roissy airport (50 min.), Paris (60 min), and London (80 min). With a lively atmosphere and a reasonable cost of living, Lille is an attractive place to stay.