

Post-doc position in biology or soft matter physics (15 months)

Role of microtubule dynamics regulation in the mitotic spindle positioning

A post-doctoral position is available immediately in the research group "Reverse engineering cell division" (igdr.univ-rennes1.fr/en/research/research-groups/jacques-pecreaux-group ; pecreaux.openwetware.org) supervised by Hélène Bouvrais and Jacques Pécrcéaux at the Institute of Genetics and Developmental biology of Rennes (IGDR, CNRS UMR 6290 / Univ. Rennes 1, director: Claude Prigent), Brittany, France. The Pécrcéaux's group focuses on uncovering mechanisms of cell division, in particular dynamics and robustness, through a multidisciplinary approach that combines cell biology, biophysics (modelling and in *silico* approaches), systems biology and image processing. The chosen candidate will contribute to understand the role of microtubule dynamics in the positioning of the mitotic spindle during the cell division, in a timely and robust fashion, using the nematode *Caenorhabditis elegans* as model organism.

Scientific environment:

The IGDR (<http://igdr.univ-rennes1.fr/>) is a vibrant research institute featuring established teams and dynamics new labs. Research covers genetics, regulation of expression, cell division, membrane trafficking and polarity. Furthermore, some teams are involved in translational research with CHU Rennes to study genetic diseases or some cancers, and a priority is to push forward interdisciplinary research.

Background and context:

The *C. elegans* one-cell embryo undergoes an asymmetric division, where the spindle is first maintained in cell center via so-called "centering forces", then elongated and posteriorly displaced via cortical "pulling forces". We quantified spindle kinematics and dynamics at cell scale and paved the way towards understanding centering in metaphase and timely regulation of cortical pulling forces in anaphase. We aim to understand the microscopic origin of these mechanisms. Landing assay, already developed to measure astral microtubule contacts duration, suggests two populations of microtubules distinct by their dynamics and regulated in space and time. We made the assumption that the two overlapping forces (centering and pulling) may relate to microtubules that display two different dynamical behaviors at the cortex revealed by two distinct residency times.

Goals of the project:

The measurement of two populations of microtubules displaying distinct dynamical behaviors at the cortex could reveal in a direct way the temporal and spatial regulation of the mechanical forces involved in the complex mechanisms of mitotic spindle positioning. The goals of this project are to (1) decipher how the spindle is maintained in cell center at metaphase and (2) how pulling forces are timely regulated. Using the developed landing assay in association with key proteins depletion by RNAi, the chosen candidate will decipher the functional roles of these microtubule populations. He will summarize the mechanisms at the heart of the robustness of spindle positioning. Furthermore, a simulation of this model will be built to produce a virtual cell division based on the use of "Cytosim", originally developed by F. Nédelec.

Requirements and position details:

The candidate has a PhD in biology or physics, with experience in molecular cell biology or soft matter physics. Experiences in nematode biology or microscopy are advantageous. • **She/He has worked at least 1 year out of France during the last 3 years (position funding mandatory mobility condition).** • A strong interest for biophysics and image processing or cell biology, respectively, is mandatory although no education or experience in these fields is required. • Candidate is expected to be highly motivated, with excellent interpersonal and communication skills to collaborate in an interdisciplinary team • She/He is fluent in spoken and written English (French is not mandatory). • Gross salary will range between 27,400 and 34,400 €/year according experience and qualifications. The position gives right to social benefit and includes health insurance. CNRS is an equal opportunity employer. **Position is available immediately.** • The candidate will benefit from the interdisciplinary skills of the team. Indeed, she/he will learn to work and interact with scientists from various fields (biologists, statistician, physicists, and biophysicists). Furthermore, she/he will receive support of the team in applying to any grants to pursue her/his work at the IGDR.

To apply (or for informal enquiries), please send (preferably by email and as a pdf):

to Dr Jacques Pécrcéaux, jacques.pecreaux@univ-rennes1.fr and Dr Hélène Bouvrais, helene.bouvrais@univ-rennes1.fr (IGDR, CNRS UMR 6290 - Faculté de Médecine (Université Rennes 1), 2 avenue du Pr L. Bernard, CS 34317, 35043 Rennes cedex, France

A *Curriculum Vitae* (CV) detailing your publications, conference contributions and your achievements. • A cover letter detailing your motivation and skills to take over the project. • And the names of two referees. This call will remain opened until a suitable candidate is found. Applications will be assessed in the order in which they are received.