

Bringing the Genome to Life: Imaging Enhancer Dynamics

Postdoctoral positions at Institut Pasteur

Several postdoctoral positions are opened at the Institut Pasteur (Paris, France) to visualize the topological and functional dynamics of small regulatory pieces of DNA, called enhancers, in the animal genome. Successful candidates will join a collaborative and interdisciplinary venture in the newly formed unit [Physics of Biological Function](#) of biophysicist Thomas Gregor.

Presentation of the unit and its research topics:

The Unit for the Physics of Biological Function at Institut Pasteur studies the basic physical principles that govern the existence of multicellular life. A core focus of the lab is to understand biological development—the complex process through which an organism grows from a single cell into a differentiated, multicellular organism—from a physics perspective. As such, we formulate and experimentally validate quantitative models that describe how individual cells interact and organize in order to generate complex life forms.

Our main interests lie in:

- multicellular pattern formation
- transcriptional regulation in the context of development
- molecular limits to biochemical sensing
- emergence of collective behaviors in multicellular systems.

Description of a representative project:

The dynamic organization of the genome in time and space plays a crucial role in the functional specification of a cell. In particular the interplay between multiple distant enhancers and their target gene promoters has critical mechanistic consequences on gene activity patterns during cell differentiation and development. We are developing state-of-the-art high-resolution live imaging techniques to resolve multiple enhancers in space and time to correlate the 3D motion of the DNA polymer with gene activity. The challenge is to develop the right imaging modalities that optimize our need for high temporal and spatial resolution, and to image a large field of view with multiple (≥ 4) colors simultaneously.

[For more information see: Chen *et al.* (2016). *Direct visualization of transcriptional activation by physical enhancer-promoter proximity*. bioRxiv 099523; doi: <https://doi.org/10.1101/099523>.]

Expected profile of the candidate:

Candidates will have a strong interest for collaborative and interdisciplinary research. They should have a proven successful track record equipped with one, but ideally a combination of the following skills:

- live-cell microscopy, single molecule imaging
- microscope design and implementation
- hard- and software design for microscope control
- computational image analysis

Ability to work independently and in collaboration with members of the lab and international collaborators in a dynamic, diverse and multinational group is essential. English is the working language.

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Applications should include a statement of research interests and motivation, a CV, and contact information for three references. Applications will be reviewed as soon as they are received. Funding is available for multiple positions but candidates will be encouraged to apply for independent competitive grants. Long-term funding is possible upon mutual agreement. Alternative projects that match with the overall goals of the unit can be discussed at the interview stage.