

OFFRE DE STAGE
MASTER 2 / INGENIEUR
(Possibilité de continuer en thèse)

Optogenetic-based inference of chromatin biophysics

Host Laboratory :

Laboratoire de Biologie et Modélisation de la Cellule (LBMC), UMR5239, ENS de Lyon, France.

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Abstract:

How flexible are chromosomes in cells ? How do cells regulate this flexibility ? These fundamental questions are unanswered due to technical limitations : there is no straightforward way to measure chromatin flexibility *in vivo*. In an ANR-funded project, we propose a strategy based on optogenetics (specific genetic alterations induced by visible light) and biophysical modeling of the chromatin fiber to infer quantitative estimates of chromatin flexibility in live yeast cells that repair a DNA damage. We are looking for a motivated M2 student (school year 2023-2024) who will construct yeast strains suitable for such measurements, perform light-induced genetic manipulations and, if the student is interested in biophysical modeling, confront the experimental data to models and calibrate informative parameters. Various techniques will be covered, from molecular and cellular biology to computational analysis of high-throughput data and modeling. A PhD. fellowship will be opened in 2024. Depending on the success of the internship and the interest of the student, he/she will have the possibility to apply to this doctoral training.

Technologies utilisées :

Molecular biology, yeast genetics, optogenetics, flow-cytometry, NGS sequencing, bioinformatics, biophysical modeling.

Mots clés : chromatin biology, biotechnology, optogenetics, chromosomal conformation.

Publications d'intérêt :

Duplus-Bottin H, Spichty M, Triqueneaux G, Place C, Mangeot PE, Ohlmann T, Vittoz F and Yvert G. [A single-chain and fast-responding light-inducible Cre recombinase as a novel optogenetic switch](#). *eLife* **10**, e61268 (2021).

Tortora, M. M., Salari, H. & Jost, D. Chromosome dynamics during interphase: a biophysical perspective. *Curr. Opin. Genet. Dev.* **61**, 37–43 (2020).

Jerković, I. & Cavalli, G. Understanding 3D genome organization by multidisciplinary methods. *Nat. Rev. Mol. Cell Biol.* 1–18 (2021) doi:10.1038/s41580-021-00362-w.