



## 3 to 6 months Master 2 internship in experimental biophysics (starting from February 2023)

Title of the research topic	Mechanical stress and genome integrity
Laboratory	Laboratory of Computational and Quantitative Biology (LCQB), UMR 7238 CNRS, Sorbonne University, 75005 Paris
Master supervisor Co-supervisor	Judith Miné-Hattab Morgan Delarue
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### Scientific Project:

Nuclear architecture is an important determinant for essential cell functions. Most of the studies addressing nuclear organization have been conducted in exponentially growing cells observed as a monolayer with no particular stress. In contrast, under natural conditions, cells often proliferate in a confined environment or undergo mechanical stresses. How the dynamic organization of the nucleus is changed and how it affects essential functions of the genome remains poorly understood. We propose to investigate how chromatin organization and molecular diffusion are modified in cells under compression and how these changes affect DNA repair mechanisms. In response to compression, changes in chromatin architecture might occur at multiple scales, from the nucleosome repositioning along the chromatin fiber to the tuning of the fiber flexibility and the modification of sub-compartments. Thus, we will use a multi-scales approach from the imaging of individual histones inside living cells, to the gene and the whole nucleus organization. We will then test if compression can induce DNA damage and by which pathway they can be repaired.

During the project we will use budding yeast as a model system but will be extended to human cells using spheroid as a model system.

The internship will be performed in the team of Judith Miné-Hattab at the LCQB (Paris) in collaboration with the team of Morgan Delarue (LAAS, Toulouse). During the first 2 weeks of the internship, the student will be trained in the Delarue team for the micro-fluidic part of the project.

**The Master internship could open to the possibility of a PhD thesis on this topic.**

**Techniques used:** Fluorescent microscopy, super-resolution microscopy, micro-fluidic, advanced image analysis, cell biology, yeast.

**Publications related to the topic:** Miné-Hattab *et al* eLife 2021 ; Miné-Hattab *et al*, Curr Opin Cell Biol 2019 ; Alric *et al* 2022 Nature physics