

# Wetting of heterochromatin at the nuclear surface

Location: Institut Curie, Paris. 'Nuclear Dynamics' and 'Physical Chemistry' units.

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The general determinants of chromatin conformation in the nucleus of Yeast *S. cerevisiae* has been observed by imaging (Bystricky et al., 2004; Kimura et al., 2013; Therizols et al., 2010) as well as genomics techniques (Duan et al., 2010) and characterized along the cell cycle (Lazar-Stefanita et al., 2017). These results has been modeled by coarse grained polymer simulations that statistically recapitulates the main features of nuclear organization in interphase such as the Rabl configuration (Arbona et al., 2017; Wong et al., 2012). A special role is played by the heterochromatin located at the telomeres, that forms aggregates that depends on a molecular glue (Sir3, Hozé et al., 2013; Ruault et al., 2011, 2021).

More recent results are showing that those aggregates localize at the nuclear membrane during exponential growth forming micro-aggregates, and localizes in the center of the nucleus forming a macro-aggregate in stationary phase (Guidi et al., 2015). Revealing an interesting link between nuclear localization and aggregate shape.

Starting from the computational model for the yeast nucleus and in light of these recent results, we want to use simulations to understand the relations between the nuclear membrane and micro-phase separation. In particular, we want to explore the hypothesis that physics determine the formation of micro-phases at the nuclear membrane by a mix of **brush and wetting effects**. The intern will use simulation to predict:

- effects of surface wetting that alter the shape of phases.
- Entropic effects of the nuclear surface, that can change the magnitude of brush effects

We search an enthusiast and curious intern in computational biology, able to program in python and willing to advance his understanding of coarse grained simulations. The intern will experience a lively multidisciplinary context, being co-supervised by Scolari Vittore and Myriam Ruault in the nuclear dynamcs unit of Institut Curie.

## Context

Our team studies the physical organization of the genome –in space and in time– in the nucleus and its relationship with transcriptional regulation or other functional genomic processes. We take a quantitative and interdisciplinary approach at the physics-biology interface, combining advanced microscopy, mechanical micro-manipulation and physical modeling.

Our team is part of the 'Physical Chemistry' unit (UMR168), with physicists working on diverse biological topics and the 'Nuclear Dynamics' unit (UMR3664), with biologists studying different aspects of the cell nucleus.

Institut Curie is a major player in cancer research. It consists of a Research Center for basic research and Hospital group for translational and clinical research. It has more than 1000 employees and is strongly international. It is an inclusive, equal opportunity employer and is dedicated to the highest standards of research integrity.

### Application

Contact us at [vittore.scolari@curie.fr](mailto:vittore.scolari@curie.fr) with your CV and a letter explaining your interest in joining our lab.

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