

Simulation of aster centering

Simulation de la centration d'un astre

Proposition de stage / Internship offer

In large cells during development, DNA needs to be placed at the center of the cell. This is done by a radial array of microtubules called aster. It is now accepted that pulling forces on the microtubules perform centration. However, how centration is influenced by microtubules flexibility and dynamics remains largely unknown.

The project Using an existing simulation software, the student find under which conditions centering is reliable, given microtubules properties. This will be backed by experimental data and physical analysis of the centration forces. Using the simulations, the student will seek to design experimental strategies to identify the pulling mechanism.

Methods The student is expected to run simulations, implementation of new tools is not required. Scripting will be necessary for data analysis. Most importantly, the student will need to develop an understanding of the physical and biological context.

The lab The team "Cellular Spatial Organization" is an interdisciplinary team that hosts both theoreticians and experimentalists, and has gained a reputation on intracellular architecture and mechanics. We develop cutting-edge methods both experimental and theoretical. It is in an ideal scientific environment for a biophysicist, being located in a biology institute with a strong focus on experimental biophysics, and neighbor to an experimental and theoretical physics institute. It is also conveniently located inside Paris at the intersection of several public transport networks.

Supervision The student will be mentored by Serge Dmitrieff : serge.dmitrieff@ijm.fr.
More information :

- www.biophysics.fr – www.minclab.fr
- <https://github.com/SergeDmi>
- https://twitter.com/bio_physics

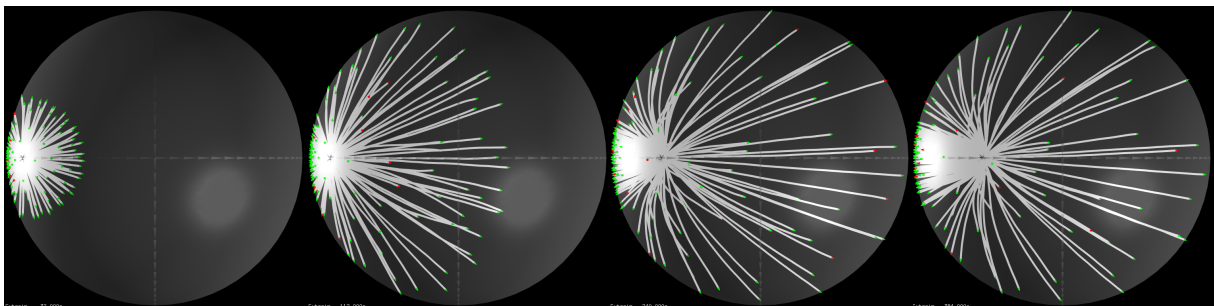


Figure 1: Overdamped Langevin simulation of aster centering using the software Cytosim. Microtubules (white) grow as an aster from an organizer. Colinear forces along microtubules enable the centering of the aster.