

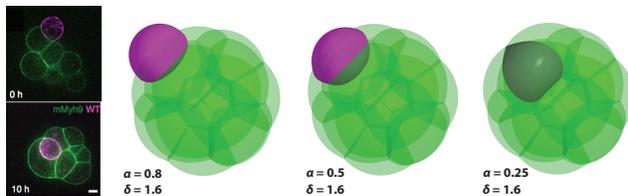


3 years PhD position - to be filled now

Physical modeling of early embryo morphogenesis

Position:

A 3 years PhD position, **starting in October 2017** & **funded by the Foundation Bettencourt-Schueller**, is offered in the **new team *Multiscale Physics of Morphogenesis***, headed by **Hervé Turlier** at Collège de France (www.virtual-embryo.com). The candidate will be co-directed by Olivier Rivoire, head of the team *Statistical Biology*. He/She will work on the **physical modeling of early embryo morphogenesis**, in **tight collaboration** with the experimental group of **Jean-Léon Maître** at Institut Curie (science.institut-curie.org/team-maitre).



Internalization of a cell in a mouse embryo, experiments & simulations.

The physical principles governing the morphogenesis of mammalian embryos remain largely unknown. Early mouse embryos self-organize by a succession of cell divisions¹, deformations & rearrangements^{2,3}, leading to a stereotypical 3D structure, the blastocyst. Encapsulating a large fluid cavity, it is composed of two major cell lineages, the

inner-cell mass and the trophoctoderm, which are segregated in inside & outside layers³. The aim of this thesis is to investigate the self-organization principles of early mouse embryos from a theoretical perspective, by associating precise description of cell mechanics with simple models of cellular signaling & gene regulation. The work will combine analytical modeling and computational science to develop precise numerical simulations of embryo morphogenesis.

1. Turlier H. et al., Furrow Constriction in Animal Cell Cytokinesis. *Biophysical Journal* **106** (2014).

2. Maître et al., Pulsatile cell-autonomous contractility drives compaction in the mouse embryo. *Nat. Cell Biol.* **17** (2015).

3. Maître J-L., Turlier H. et al., Asymmetric division of contractile domains couples cell position and specification. *Nature* **536** (2016).

Skills:

The work will require **excellent knowledge** in **physics &/or mechanics**, **strong programming skills** (or the wish to learn C++) and the **real desire to work on biological problems**. The PhD student will interact closely with biologists and will work in a highly interdisciplinary/international setting, requiring very good **communication skills**. The student will also be expected to participate to the scientific life of the laboratory and to outreach activities organized by the Foundation.

Location:

Located in the heart of the Latin Quarter in Paris, Collège de France is one of the oldest Research University in France, with internationally renowned Professors & research laboratories. The Center for Interdisciplinary Research in Biology (CIRB) is a novel & interdisciplinary CNRS/INSERM structure (UMR 7241 / U1050) regrouping 21 teams focused on biological problems from various perspectives: cell & developmental biology, neuroscience, computational & mathematical biology and biophysics.

Interested candidates should contact **Hervé Turlier** herve.turlier@polytechnique.org