



Mechanobiology of Cancer Summer School · 17-21st September 2019

Guillaume Salbreux – 18th September 9.00

Physics of epithelial deformations

The shape of a biological tissue is determined by mechanical stresses acting within the tissue cells. Forces generated in the actomyosin cytoskeleton in the cells of epithelia result in cell deformation, cell rearrangements, and 3D bending of the epithelium. To understand tissue morphogenesis, force generation at the cellular scale must be related to flows and deformation occurring at the tissue scale. Here I will discuss how this relation can be captured by a 3D vertex model or by a continuum theory of active surfaces. I will discuss in particular the formation of early tumours in pancreatic cancer, and how reorganisation of the cytoskeleton in transformed cells drive early tumour deformations.

Guillaume did his PhD on the physics of active gels and cell mechanics at the Institut Curie, Paris, in the group of Jean-François Joanny and Jacques Prost. He then went to the University of Michigan for a postdoc with David Lubensky on the regular arrangement of cone cells in the Zebrafish retinal epithelium. In 2011 Guillaume started his group at the Max Planck Institute for the Physics of Complex Systems (MPI-PKS) on the physics of the cytoskeleton, working on the physics of active matter and cell and tissue mechanics. In 2015 he moved his group to the Francis Crick Institute in London to work on developing quantitative approaches to describe physical processes in biology, in close collaboration with experimental groups.