

PHD SEMINAR #3

Katharina Hennig:

The initiation of cellular migration requires breaking of symmetry which can be triggered by external cues or occur spontaneously in uniform stimulant. Critical factors are RhoGTPase-mediated cytoskeleton reorganization and asymmetric acto-myosin contraction as well as cellular traction forces. Nevertheless, this force-motion relation of migration remains so far unknown. The purpose of our study is to quantitatively examine the spatio-temporal coordination of front-rear polarization during initiation of cellular migration and to relate this sequence of morphological events to spatial changes in traction forces. Furthermore, in order to dynamically control breaking of symmetry and hence guide migration an optogenetic tool was employed which perturbs the mechanical behavior of an initially non-motile fibroblast.

Vadim Girardeau: Detection of vibrations emitted by a photo-acoustic signal

We aim at recording surface waves induced by a photo-acoustic effect. The photo-acoustic imaging is a recent medical imaging which offers performances between those of MRI and optical microscopy. The principle is to generate acoustic pressure waves, by an optical absorption followed by a thermo-elastic expansion. It combines the advantages of optical imaging (high contrast due to absorption) and acoustic imaging (high propagation depth). "I will not explain so much this part"

Until now, the commercial devices are composed of a piezo sensor to detect these acoustic waves. But the transducer has a limited bandwidth (i.e. a limited resolution) and must stay in contact with the sample to be imaged (i.e. not adapted for reflective imaging). That is why, I want to detect the acoustic waves in surface with an optical system, in order to detect deformations at few MHz with a few nanometers of amplitude.

In order to do that, I can use the Laser Optical Feedback Imaging technique (LOFI). I will explain how it works, its best operating conditions and I will detail analysis of SNR. Finally, I will show some results in low and high frequencies vibrations. "It will be the main focus of my talk"