PHD SEMINAR #7

01/04/2016 - 16H - CONF ROOM

Tess Berthier: Structured illumination microscopy (SIM), a super resolution technique applied to live cell imaging

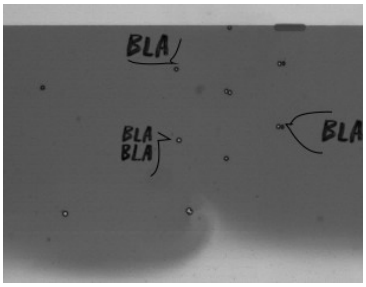
Structured illumination is based on the Moiré effect, which implies that the overlapping of two high frequency patterns creates a new pattern with a lower frequency. The microscope acts as a low-pass filter, only frequencies that are not too high can be observed. Considering that the two first patterns are your sample and a structured illumination, you will be able to observe the low frequency pattern coming from their overlapping and knowing every criteria of the structured illumination pattern (frequency, phase...), you can computationally reconstruct your sample with a better resolution than what you would have observed with the microscope only. All of this process is done in the reciprocal space and the image analysis are made with their Fourier Transform. This technique does not give as much resolution as the other super resolution approach, however, it's particularly fast and is an interesting tool if you want to see quick movements or film live cells.

In this presentation I will give an explanation of how this technique is working (I will do it with a lot of images and no super-long Fourier Transform equations so it won't be too harsh to swallow), and I'll also show some images made with this technique, how can be applied to live cell imagine et cetera.

Thomas Combriat: Streaming of acoustically excited bubbles

From an acoustic point of view, air bubbles in water are very interesting objects: because of the difference of compressibility between the air and the water, bubbles will start pulsing when submitted to an acoustic field. Thus they will behave as secondary sources of sound in the liquid.

The rapid motion of the bubble surface, thanks to the Navier-Stokes non linearity, can lead to a steady motion of the surrounding fluid (called the streaming), even though the motion of the bubble is periodical and the Reynolds number of the flow is very low.



In this state, they also start to interact at long distance with each other, creating "acoustically bound" crystals of bubbles. These crystals could share properties with meta-materials, and could lead to the SASER effect which is the analogous of the LASER but for a sound wave...