



*As part of our “Nano & Micro-Systems for Cell Biology” seminar series,
we are delighted to invite you to attend this seminar to be given in english by :*

Pascal Martin

Laboratoire Physico-Chimie Curie

Institut Curie recherche

**Wednesday 21 may 2014
2pm**



The hair-cell bundle as a mechanosensor and amplifier for hearing.

**Salle des séminaires - LIPhy
Bât E - 140 Avenue de la Physique
Campus St Martin d'Hères**

nanoSCIENCES
FONDATION



The hair-cell bundle as a mechanosensor and amplifier for hearing.

The ear works as a remarkable sound detector. Hearing can indeed operate over six orders of magnitudes of sound-pressure levels, with exquisite sensitivity and sharp frequency selectivity to weak sound stimuli. Curiously, the ear does not work as a high-fidelity sound receiver, introducing in the auditory percept “phantom” tones that are not present in the sound input. In this talk, I will present micromechanical experiments at the level of the cellular microphone of the inner ear – the hair cell – whose function is to transduce sound-evoked vibrations into electrical nervous signals. In particular, I will show that hair cells can power spontaneous oscillations of their mechanoreceptive hair bundles, a tuft of cylindrical protrusions that protrudes from the apical surface of each cell. The oscillatory instability is thought to result from a dynamical interplay between ion channels, elastic proteinous linkages and active molecular motors. We find that oscillations of the hair bundle allow the hair cell to actively resonate with its mechanical input at the expense of distortions with properties that are characteristic of hearing. I will conclude by arguing that our results promote a general principle of sound detection that is based on nonlinear amplification by self-sustained “critical” oscillators in the inner ear, i.e. active dynamical systems that operate on the brink of a Hopf bifurcation.

nanoSCIENCES
FONDATION

