

## France: PhD Scholarship in Applied Mathematics and Scientific Computing, FEMTO-ST, Besançon, FRANCE

Applications are invited for a three year PhD scholarship in the FEMTO-ST Institute (see [www.femto-st.fr](http://www.femto-st.fr)) at Besançon FRANCE.

This PhD project will form part of a wider project which aims to develop new mathematical tools and a general software dedicated to Arrays of Microsystems. Arrays of Microsystems have been developed and continue their expansion in a number of scientific and technical fields. The research of the project will focus on deriving general multi-scale multi-physical models able to cover large classes of such systems. The multi-scale mathematical methods will be rooted in recently developed techniques by our group or collaborators. Part of mathematical modeling will be done in collaboration with a Laboratory of Mathematics.

The scholarship is valued at about €1.000 net per month for three years. It will be available from 1 October 2009. Application to a room on the campus is possible for low rate. Applicants should have a good undergraduate degree and, preferably, a master's qualification in Applied Mathematics, Computational Mathematics or Mechanics, or comparable postgraduate work experience.

Closing date for applications: **July 15th, 2009.**

Please email a CV and letter outlining your areas of research interest, along with names and contact details of two referees who can comment on your academic suitability to Dr Michel Lenczner (michel.lenczner[ at ]utbm.fr).

Further information on this project can be obtained by contacting:

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**Phd: Multiscale Models for Arrays of Microsystems**

**Research Area:** Applied Mathematics, Mechanics, Scientific Computation

**Required Background:** Partial Differential Equations, Continuum Mechanics, Numerical Methods, Programming skill

**Grant:** Supported by the Region Council of Franche-Comté, FRANCE

**Expected work:** At FEMTO-ST, we are developing both new mathematical tools and a software dedicated to this new field of Arrays of Microsystems described hereafter. During the thesis, we aim at deriving general multi-scale multi-physical models able to cover large classes of these systems. The multi-scale mathematical methods will be rooted in recently developed techniques, as homogenization in strongly heterogeneous media for dynamical problems, our new wave two-scale convergence and two-scale convergence in periodic electrical networks. Part of mathematical modeling will be done in collaboration with the Laboratory of Mathematics at Besançon.

**Arrays of Microsystems:** Micro-fabrication techniques yield a large variety of devices used as sensors, as actuators or even as complete systems including sensors/actuators/control processing. In an increasing number of applications, there is an interest in designing networks of micro-systems (in a same chip) instead of single ones. They are made of a repetition of a same unit or of a parameterized unit.

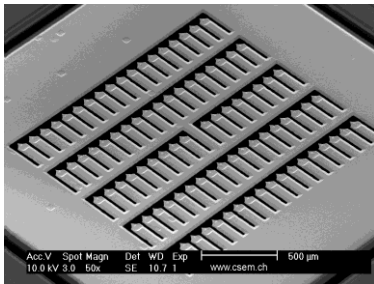


Fig 1. (a) Atomic Force Microscope Array



(b) Micro-mirror Array

We cite a number of micro-system arrays, some of them being fabricated in our institute: Cantilever Arrays (like for Atomic Force Microscope Arrays, see Fig. 1 (a), with a large range of applications in nanosciences and nanotechnologies), Micro-mirror arrays, see Fig. 1 (b), or Micro-lens arrays (used for beamers, adaptive telescopes, lithography masks, as well as for numerous optic filters for optic fibers or laser arrays), Coupled Resonator arrays, Acoustic Probes based on micro-fabricated transducers (operating thanks to a capacitive, or a piezoelectric or a magneto-strictive effect), Surface or Body Acoustic Waves devices (converting acoustic waves into electric signal and reciprocally, used in particular for phone cells), Photonic crystals or Phononic structures (for emission, transmission, amplification, detection, and modulation of wave light or acoustic waves), and Micro-membrane arrays (for pressure regulation or for sonography and other acoustic applications).

### Contact and Technical Staff

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