



Session XCII

# New Trends in the Physics and Mechanics of Biological Systems

6-31 July, 2009

**Scientific Direction:** Martine BEN AMAR, ENS-Paris (France)  
Alain GORIELY, University of Arizona (USA)

## BioMechanics and Nonlinear Elasticity

*Principles of nonlinear continuum mechanics and elasticity*, Ray OGDEN, University of Glasgow (Scotland)  
*Mechanics of rubber materials and soft tissues*, Giuseppe SACCOMANDI, Università degli Studi di Perugia (Italy)

## BioPolymers, Networks, and Active Gels

*Active fluids and gels*, Frank JULICHER, Max-Planck Institute, Dresden (Germany)  
*BioNetworks*, Fred MACKINTOSH, Free University of Amsterdam (The Netherlands)

## BioFluidics

*Life in fluids and the physics of multicellularity*, Ray GOLDSTEIN, University of Cambridge (UK)  
*BioRobotics*, Peko HOSOI, MIT (USA)

## Physiology and Morphogenesis

*Mechanics of biological growth*, Ellen KUHL, Stanford University (USA)  
*Mechanics of cancer*, Luigi PREZIOSI, Politecnico di Torino (Italy)

## Applications

*The physics of the cell membrane*, Martine BEN AMAR and Martin M. MÜLLER, ENS-Paris, (France)  
*Surface tension, wetting, and biology*, John BUSH, MIT (USA)  
*BioRheology: from molecules to tissues*, Pasquale CIARLETTA, ENS-Paris (France)  
*Morpho-elasticity*, Alain GORIELY, University of Arizona (USA)  
*Genetics and mechanics*, Michel LABOUESSE, IGBMC-Strasbourg (France)  
*Mechanics of DNA*, John MADDOCKS, EPFL (Switzerland)  
*Low-Reynolds number and complex fluids*, Michael SHELLEY, New York University (USA)  
*Microbial mechanics*, Michael TABOR, University of Arizona (USA)

## Scientific Program

With the rise of quantitative biology at the level of proteins, cells, tissues, and organs, there is a growing need and a unique opportunity for interdisciplinary interactions between physicists and life scientists. The modeling and understanding of biological systems have become some of the most important challenges for quantitative sciences. With their training in mechanics, mathematics, and modeling, physicists have a chance to play a central role in the future development of fundamental biological theories. The goal of the summer school is to present to students and researchers an integrated view of new trends and challenges in physical and mathematical aspects of biomechanics. Emphasis will be given on continuum theories and models for biological systems, essentially based on continuum mechanics, fluid or solid and their interaction. The school will be organized around 4 principal themes addressing both state-of-the-art theoretical (physics, theoretical mechanics, mathematics) aspects and applications. The main field of applications will be in the biology of the cell, plants and microbes, and in physiology.

## Registrations

Applications must reach the School **before March 1, 2009** in order to be considered by the selection committee. The full cost per participant, including housing, meals, and the book of lectures notes, is 1500 euros. Thanks to financial support by funding agencies a contribution of only **900 euros / participant** is requested. A few additional grants will be available. Application forms and additional information can be downloaded from the site: <http://w3houches.ujf-grenoble.fr/>. One can also contact the School at

ÉCOLE D'ÉTÉ DE PHYSIQUE THÉORIQUE  
La Côte des Chavants  
74310 LES HOUCHES, France

Phone: +33 -4 50 54 40 69 - Fax: +33 -4 50 55 53 25  
Email: [secretariat.houches@ujf-grenoble.fr](mailto:secretariat.houches@ujf-grenoble.fr)

Les Houches is a resort village in the Chamonix valley in the French Alps. Established in 1951, the Physics School is located in a group of chalets surrounded by meadows and woods, at an altitude of 1150 m facing the Mont-Blanc range - a very favourable environment for intellectual activity in ideal surroundings for hiking, mountaineering and sight-seeing.

The Physics School is affiliated with Université Joseph Fourier and Institut National Polytechnique de Grenoble, and is supported by the Ministère de la Jeunesse, de l'Éducation Nationale et de la Recherche, the Centre National de la Recherche Scientifique (CNRS) and the Direction des Sciences de la Matière du Commissariat à l'Énergie Atomique (CEA/DSM).