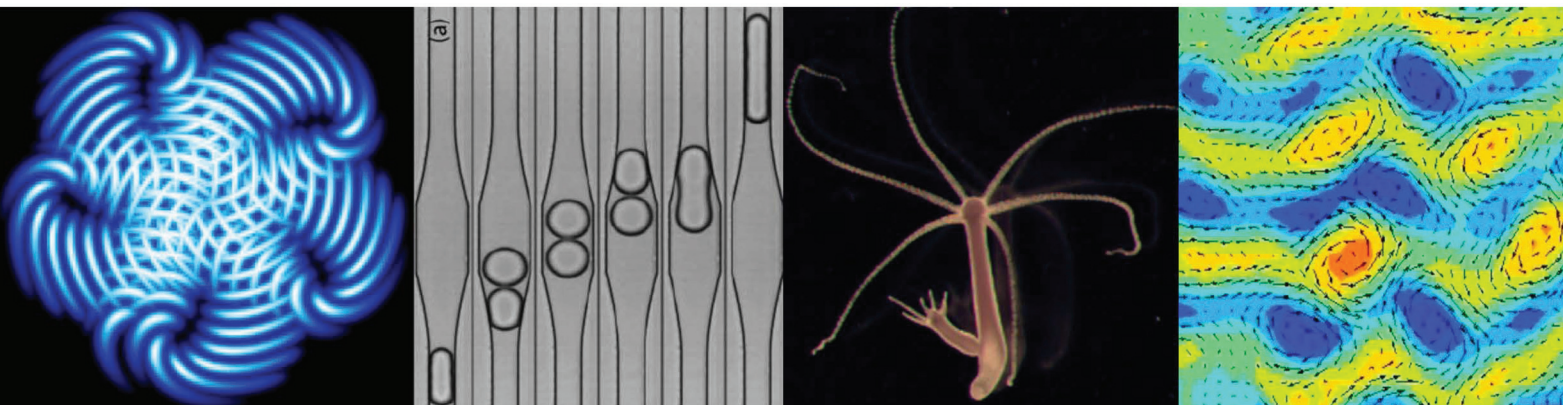
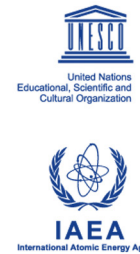
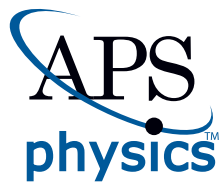




The Abdus Salam  
International Centre  
for Theoretical Physics  
50th Anniversary 1964-2014



## School on Hands-On Research in Complex Systems

29 June – 11 July 2014  
(Miramare – Trieste, Italy)

The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy, will organize a School on Hands-On Research in Complex Systems from **29 June – 11 July 2014**. The activity is co-sponsored by the American Physical Society.

**This school will provide interactive experiences with hands-on research involving table-top experiments with computer data acquisition and computational modeling. The laboratory experiences, mathematical modeling, and lectures will focus on complex systems in the physical and life sciences. The faculty will include eminent scientists who have conducted frontier table-top research published in leading international scientific journals.**

### TOPICS AND FACULTY:

- Cellular-level Locomotion** - bacterial shape and motility (V. Gordon, University of Texas)
- Turbulence** - flow analysis by imaging particles (M. Schatz, Georgia Tech)
- Fluid Instabilities** - analyze digital movies to determine dynamics (H. Swinney, University of Texas)
- Modeling with MATLAB**: introduction to MATLAB; Molecular Dynamics; granular media (M. Shattuck, City College of New York)
- Arduino microcontroller board** - data acquisition, experiment control and 3D printing (HP Zhang, Shanghai Jiao Tong University)
- Dynamics of bacteria suspensions** - optical motion analysis of Brownian motion and other low Reynolds number phenomena (P Cicuta, Cambridge University)
- Computational fluid dynamics** - using MATLAB for bifurcation analysis, simulation (L Tuckerman, ESPCI/Paris)
- Forecasting nonlinear systems** - weather prediction, network dynamics (B Hunt, University of Maryland)
- Nonlinear optics** - chaos and synchronization in optical systems (T. E. Murphy, University of Maryland)
- Chemical oscillators** - asynchronous dynamics in networks (M. Tinsley, West Virginia University)

### PARTICIPATION

Scientists and students from all countries, that are members of the United Nations, UNESCO or IAEA, may attend the School subject to approval by the activity Directors. The School is intended mainly for early career scientists and advanced Ph.D students from developing countries, working in areas such as chemistry, physics, biology, mathematics, and engineering. As the School will be conducted in English, participants should have an adequate working knowledge of that language. Although the ICTP main purpose is to help researchers from developing countries, through a programme of training activities within a framework of international cooperation, a limited number of students and post-doctoral scientists from developed countries are also welcome to attend.

There is no workshop registration fee. As a rule, travel and subsistence expenses of the participants should be borne by the home institutions. However, participants who are nationals of and working in a developing country and who are not more than 45 years old, will be considered, upon request, for subsistence support and partial travel. Such support is available only for those who attend the entire activity.

More information about the Hands-On Schools is at [www.handsonresearch.org](http://www.handsonresearch.org)

### HOW TO APPLY FOR PARTICIPATION

The application form can be accessed at the activity website <http://agenda.ictp.it/smr.php?2591>

Once in the website, comprehensive instructions will guide you step-by-step, on how to fill out and submit the application form. Closing date for receipt of the applications is: **8 February 2014**.

**ACTIVITY SECRETARIAT:** Telephone: +39-040-2240-355 Telefax: +39-040-2240-585

E-mail: [smr2591@ictp.it](mailto:smr2591@ictp.it) ICTP Home Page: <http://www.ictp.it/>



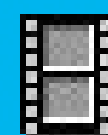
**M. Schatz**  
Georgia Tech., USA

**M. Shattuck**  
City College, New York, USA

**H.L. Swinney**  
University of Texas, USA

### LOCAL ORGANIZER

**J. Niemela**  
ICTP, Trieste, Italy



Video on Hands-On School (3 minutes)

**DEADLINE**  
**For requesting participation:**

**8 February 2014**