



Hands-On Research on Complex Systems School

www.handsonresearch.org

26 July – 7 August 2009

Universidade Federal do ABC, São Paulo, Brasil

Professor Luiz Bevilacqua, President, Universidade Federal do ABC

Sponsored by The Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste, Italy)
Co-sponsored by Fapesp, CNPq, Capes, and Universidade Federal do ABC

DIRECTORS: E. Gueron, V. Kenkre, R. Köberle, R. Roy, K. Showalter, H. Swinney

TOPICS

modeling with MATLAB	networks	nonlinear optics	bouncing drops
animal locomotion	granular physics	fluid dynamics	cell stimuli
chemical oscillators	synchronization	electronic circuits	soft matter

This two-week-long school will provide an interactive experience with hands-on research involving tabletop experiments with real-time computer data acquisition and associated computational modeling. Lectures and hands-on experiences will focus on complex systems in the physical and life sciences. This research is inherently interdisciplinary, and topics will range from laser chaos to spatial patterns in fluids to biological networks. The school faculty will be eminent scientists who have conducted frontier table-top research published in leading international scientific journals such as *Nature*, *Science*, and *Physical Review Letters*.

While many areas of research now involve large numbers of collaborators using very expensive instrumentation, the *Hands-On School* is focused on frontier research that can be conducted by individuals or small groups using rather modest instrumentation. Examples will be taken from research of the faculty members, who will lecture and lead small groups in laboratory sessions involving running experiments and performing associated mathematical and computational modeling. Data acquisition, data analysis, and computational modeling will be performed in the MATLAB environment.

Lecturers and leaders of the hands-on experiences include:

- M. Girvan (University of Maryland), modeling of biological and social networks
- D. I. Goldman (Georgia Tech), nonlinear dynamics of animal locomotion
- V. M. Kenkre (University of New Mexico), mathematical modeling and condensed matter
- D. Lathrop (University of Maryland), chaotic Boolean networks
- E. C. Rericha (University of Maryland), response of biological cells to stimuli
- R. Roy (University of Maryland), nonlinear optics and instabilities
- M. Schatz (Georgia Tech), bouncing drops and metronome synchronization
- A. Sen (Institute for Plasma Research), chaotic oscillators
- M. Shattuck (City University of New York), patterns and phase transitions in sand
- K. Showalter (West Virginia University), synchronization in chemical patterns
- B. Storey (Olin College), mathematical modeling methods; fluid instabilities
- H. L. Swinney (University of Texas), patterns in fluid flow between rotating cylinders
- A. Yodh (University of Pennsylvania), dynamics of soft matter

Local Organizers:

Luiz Bevilacqua - Univ. Federal do ABC
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PARTICIPANTS

The School is mainly intended for young scientists and PhD students from developing countries, working in areas such as physics, chemistry, biology, and mathematics. Scientists from developed countries who are interested in international cooperation are also welcome to apply --- the school will be open to scientists from all countries that are members of the United Nations, UNESCO or IAEA. The School will be conducted in English; therefore, participants should have an adequate working knowledge of this language.

An announcement of School can be found at:

http://cdsagenda5.ictp.trieste.it/full_display.php?smr=0&ida=a08201

Applicants should fully complete and (ink) sign the *Request for Participation* form, available from the ICTP WWW server. A PDF or RTF file of the completed *Request for Participation* form and a statement describing how the applicant would benefit from participation in the Hands-On School should be sent by email together with the application form (with subject line *Hands-On Research*) to the Abdus Salam International Centre for Theoretical Physics, smr2090@ictp.it

There is no registration fee, and lodging and meals will be provided for all participants. Support for travel is available for participants who are nationals of developing countries and are currently working in their home country, but every effort should be made by candidates to secure travel support from their home institutions. A statement of need must be made by completing the last page of the application form. All participants are required to take part in all aspects of the school for the entire duration.

July 2008

Application Deadline: 1 February 2009