The Abdus Salam International Centre for Theoretical Physics
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WINTER COLLEGE on OPTICS

Applied Optical Techniques for Bio-imaging: Advanced Microscopy and Spectroscopy in Life and Environmental Sciences

13 - 24 February 2017

Miramare - Trieste, Italy

The Abdus Salam International Centre for Theoretical Physics (ICTP), in collaboration with the International Commission for Optics (ICO), the Optical Society of America (OSA), the International Society for Optics and Photonics (SPIE), the European Optical Society (EOS), Società Italiana di Ottica e Fotonica (SIOF), the International Society on Optics Within Life Sciences (OWLS), will organize a Winter College on Optics "Applied Optical Techniques for Bio-imaging: Advanced Microscopy and Spectroscopy in Life and Environmental Sciences", which will be held at ICTP, Trieste, Italy, from 13 to 24 February, 2017.

DIRECTORS: H. Cabrera *(Venezuelan Institute for Scientific Research, Merida, Venezuela)*
M.L. Calvo *(Universidad Complutense de Madrid, Spain)*
A. Diaspro *(Istituto Italiano di Tecnologia, Italy)*
V. Lysiuk *(V. Lashkariov Institute of Semiconductor Physics, Ukraine)*
N. Tosa *(Nat. Inst. for Research & Development of Isotopic and Molecular Technologies, Romania)*

LOCAL ORGANIZERS: J. Niemela *(ICTP, Italy)*, M. Danailov *(Elettra, Italy)*, D.A. Cojoc *(IOM, Italy)*

The College will address fundamental and experimental aspects of advanced Microscopy, Spectroscopy and related techniques. The scope of the course is to promote new theoretical and experimental methods, concepts, instruments, measurement techniques and data analysis routines for both Laboratory and industrial applications to train students and scientists, as well as to coordinate international activities and collaborations in this area. By focusing on both theory and applications, the College will also provide an interesting intersection of emerging techniques and experimental methods with theoretical advances in the field. The lectures will focus on a variety of topics related to biological applications, environmental research and material characterization. Hands-on sessions will be organized every day of the college in the ICTP laboratories accompanied by library documentation finalized with round-table discussion.

MAIN TOPICS

- Introduction to optical microscopy, confocal microscopy, phase contrast microscopy and super-resolution
- Bio-imaging processing and speckle interferometry bio-imaging
- Advanced fluorescence microscopy, fluorescence nanoscopy and label free approaches in microscopy
- Mobile-phone based fluorescent microscopy: sensing and diagnostics
- STED microscopy: the way to Nobel Prize
- Polarization microscopy: biomedical imaging and diagnostics
- Photothermal spectroscopy and microscopy: related techniques and applications
- Time-resolved and multispectral spectroscopy. Biosensing by surface plasmon resonance
- Optical properties of thin films, optical lithography, applications of nanostructured porous materials for biomedicine
- Optical tweezers and applications

HANDS-ON SESSIONS
Responsible professor: H. Cabrera

All applicants are encouraged to present, at the time of the application process, their own research or projects related to the topics of the particular experimental sessions (with the CV). The responsible organizers of the College will perform a selection process of projects. The selected participants will have the possibility to bring their own samples for measurements during the laboratory sessions. For this task, there may be a prior coordination with the Laboratory Director.

An ICTP **PREPARATORY SCHOOL** will be organized the week before the College (**from 6 to 10 February 2017)** for a limited number of selected participants. The Preparatory School will provide background tutorials and exercises designed to help the participants in following the College lectures.

The **LAMP** (Laser, Atomic and Molecular Physics) program is intended for presentations by the participants. All participants are encouraged to present their own research, either in poster form or as a short oral presentation, and the program will be finalized sufficiently prior to the start of the College. Poster prizes will be awarded, sponsored by the International Society for Optics and Photonics (SPIE).

GRANTS

A limited number of grants are available to support the travel and living expenses of selected participants, with priority given to participants working in a developing country and who are at the early stages of their career. There is no registration fee.

HOW TO APPLY

Deadline: **October 16, 2016**.
Link to the online application can be found on the main College's webpage: **http://indico.ictp.it/event/7920/**

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CO-SPONSORED by:

International Commission for Optics
Commission Internationale d'Optique

OSA The Optical Society

SPIE. CONNECTING MINDS. ADVANCING LIGHT.

EOS European Optical Society

SIOF

OWLS International Society on Optics Within Life Sciences
Non-Profit Organization established on August 13, 1990

DEADLINE

OCTOBER 16, 2016