

WINTER COLLEGE on OPTICS:

Optical Frequency Combs

from multispecies gas sensing to high precision
interrogation of atomic and molecular targets

15 - 26 February 2016

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: Frequency Combs, which will be held at ICTP, Trieste, Italy, from 15 to 26 February, 2016.

DIRECTORS: K. Corwin (Kansas State University, U.S.A.), M. Marangoni (Politecnico di Milano, Italy),
P. Maslowski (The Nicolaus Copernicus University in Torun, Poland)

LOCAL ORGANIZERS: J. Niemela (ICTP, Italy), M. Danailov (Elettra, Trieste)

As a coherent bridge between the radiofrequency and the optical frequency domain, frequency combs have revolutionized the field of optical frequency metrology and paved the way to a new generation of atomic clocks based on ultra-narrow optical transitions. Their fine, discrete, stable, reproducible and controllable spectral structure, readily referable to the primary microwave standard, also makes combs ideal tools for high-resolution molecular spectroscopy and sensing of multiple trace gases. The Winter School in Optical Frequency Combs responds to the need to provide physicists with a comprehensive overview on their properties, their synthesis and their main applications, with a specific focus on molecular spectroscopy and trace gas sensing. The school is particularly targeted to young researchers, especially at the Ph.D. and postdoc level who either work in this area or hope to do so.

MAIN TOPICS

- Optical Frequency combs: the history of a Nobel prize
- Introduction to stable phase sources, optical clocks and coherent frequency transfer
- Optical frequency combs across the spectrum
- Molecular spectroscopy and trace gas sensing: an overview
- Linking old and new: High precision comb-assisted spectroscopy
- Interaction of the femtosecond pulse train with an atomic or molecular sample - direct frequency comb spectroscopy
- Frequency combs for broadband spectroscopy and trace gas detection
- Testing the limits (tests of fundamental physics, attosecond timing, etc.)

An ICTP **PREPARATORY SCHOOL** will be organized the week before the College (**from 8 to 12 February 2016**) 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).

PARTICIPATION

Scientists and students from all countries that are members of the United Nations, UNESCO or IAEA may attend the Workshop. As it will be conducted in English, participants should have an adequate working knowledge of this language. As a rule, travel and subsistence expenses of the participants should be borne by the home institution. Every effort should be made by candidates to secure support for their fare (or at least half-fare). However, limited funds are available for some participants, who are nationals of, and working in, a developing country. Such support is available only for those who attend the entire activity. There is no registration fee.

HOW TO APPLY

Deadline: **October 16, 2015.**

The application form can be accessed at the activity website:

<http://indico.ictp.it/event/7593>

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DEADLINE

OCTOBER 16, 2015

