



The Abdus Salam
**International Centre
for Theoretical Physics**
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Advanced Workshop on Non-Equilibrium Bosons: from Driven Condensates to Non-Linear Optics

19 – 23 August 2013

(Miramare - Trieste, Italy)

The Abdus Salam International Centre for Theoretical Physics is organizing an *Advanced Workshop on Non-Equilibrium Bosons* to be held at ICTP, Trieste, Italy from 19 to 23 August 2013.

Recent progress in nano-engineering stimulated broadening studies of a new kind of cooperative phenomena in condensed matter systems: exciton-polariton Bose-Einstein Condensation (BEC) in microcavity semiconductor devices. As experimental implementation, these systems have some advantages as compared to ultra-cold gases: the effects of interest take place at temperatures of 0.1-1 K scale in contrast to nano-Kelvin scale for atomic BEC. The condensation kinetics (thermalization, vortex dynamics and the superfluid motion) can be accessed by optical methods. The bosons forming exciton-polariton condensates are not at thermodynamic equilibrium: because of the finite polariton life time, stationary states with macroscopic numbers of polaritons should be supported by an outside pumping. Being driven, the exciton-polariton condensates differ significantly from the conventional BEC-systems. A rich variety of phenomena in exciton-polariton systems includes polarization and interference effects, possible co-existence and interaction of different BEC phases of non-trivial topology, optical analogies of Josephson effect, effects of disorder, possible lasing and other non-linear optical phenomena in the specific microcavity configuration. A circle of problems to study is a synthesis of ones traditional for modern condensed matter physics and non-linear optics.

The goal of this Advanced Interdisciplinary Workshop is to bring together leading experimentalists and theorists working in the field of condensed matter physics, strong light-matter interaction and non-linear optics to foster a "cross-fertilization" between these communities.

The topics will include:

- ✓ Strong light-matter interactions
- ✓ Condensation of excitons, bi-excitons and polaritons in semiconductor microcavities
- ✓ Out of equilibrium and driven condensates: effects of dissipation
- ✓ Many-body localization
- ✓ Quantum quenches in optical absorption
- ✓ Radiation in disordered exciton - polariton structures: lasing, synchronization
- ✓ Polariton superfluids and supersolids: vortices and persistent currents
- ✓ Multi-component condensates and spin textures
- ✓ Single-photon non-linear optics
- ✓ Dynamical localization and non-linear waves

Participation

Applicants from all countries that are members of the United Nations, UNESCO or IAEA may attend. As the Workshop will be conducted in English, participants should have an adequate working knowledge of this language. Although the main purpose of the Centre is to help research workers 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.

As a rule, travel and subsistence expenses of the participants should be borne by their home institutions. 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 to those attending the entire activity. **There is no registration fee.**

HOW TO APPLY FOR PARTICIPATION

The Online Application can be accessed at the activity website: <http://agenda.ictp.it/smr.php?2477>. Comprehensive instructions will guide you step-by-step on how to fill out and submit the application form. Kindly send all file attachments in Word or Acrobat format.

Secretariat: Ms. Rosa del Rio (smr 2477)

Telephone: +39-040-2240396 - Telefax: +39-040-22407396 - E-mail: smr2477@ictp.it

ICTP Home Page: <http://www.ictp.it>

December 2012

Organizers

Boris Altshuler
(Columbia, New York, U.S.A)

Sergej Flach
(Massey University, Auckland,
New Zealand)

Atac Imamoglu
(ETH, Zurich, Switzerland)

Alexey Kavokin
(University of Southampton, UK)

Vladimir Yudson
(ISAN, Troitsk, Moscow, Russia)

Local Organizer

Mikhail Kiselev
(ICTP, Trieste, Italy)

List of Invited Speakers

I. Aleiner (USA)
A. Amo (France)
A. Aspect* (France)
J. Baumberg (United Kingdom)
J. Bloch (France)
L. Butov (USA)
C. Ciuti (France)
B. Deveaud-Pledran (Switzerland)
S. Fishman (Israel)
M. Inguscio (Italy)
D. Krizhanovskii (United Kingdom)
I. Lerner (United Kingdom)
P. Littlewood (USA)
Z. Ovadyahu (Israel)
A. Pikovsky (Germany)
Y. Rubo (Mexico)
M. Segev* (Israel)
G. Shlyapnikov (France)
D. Stone* (USA)
M. Wouters (Switzerland)
Y. Yamamoto (USA & Japan)

* to be confirmed

DEADLINE

15 April 2013