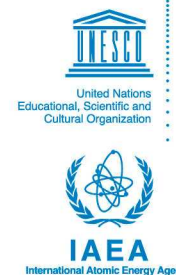




The Abdus Salam
International Centre for Theoretical Physics



Summer School on Quantum Many-Body Physics of Ultra-Cold Atoms and Molecules

2 – 13 July 2012

(Miramare - Trieste, Italy)

The Abdus Salam International Centre for Theoretical Physics is organizing a *Summer School on Quantum Many-Body Physics of Ultra-Cold Atoms and Molecules* to be held at ICTP, Trieste, Italy from 2 to 13 July 2012.

The aim of this School is to bring together both leading scientists from all over the world to discuss current frontiers of research in ultra-cold atomic and molecular gases and young PhD students, postdocs, researchers working on ultra-cold gases. The program will focus on the analysis of novel quantum phases and quantum phase transitions in mono-atomic gases, mixtures of fermionic and bosonic atoms in traps and optical lattices and its applications to quantum information processing and metrology. In particular, ultra-cold gases have been used to simulate many known condensed matter phenomena such as superfluid-insulator transitions, BEC-BCS crossover, Anderson localization with unprecedented control. In addition, the ultra-cold atomic and molecular gases reveal completely new phenomena which are not possible to realize in standard condensed-matter systems, since interactions, hopping, dimensionality and temperature can be fully controlled in traps and optical lattices.

The School program will consist of 10 lecture mini-courses (3-4 lectures each) that pedagogically summarize the main challenges and recent results on each area. The lecture courses will be delivered by the leading experts in both theory and experiment in ultra-cold atomic and molecular gases. A computer based laboratory will be organized to make some practice on the numerical simulations of many-body physics of ultracold-cold gases, giving particular importance in this session to quantum Monte Carlo simulations, which are widely used in the context of ultra-cold atomic physics.

A poster session will also be organized to give opportunities to the participants to present their research activities and to exchange ideas with the lecturers, improving at the same time their presentation skills following the advices of senior researchers.

The School will be followed by the Research Workshop on ultra-cold atomic gases as quantum simulators.

Topics:

- ✦ Ultra cold atomic gases – general theory; dipolar gases
- ✦ Optical lattices, BCS-BEC crossover
- ✦ One dimensional physics in- and out- of equilibrium
- ✦ Quantum Monte-Carlo methods for imbalanced Fermi gas
- ✦ Dissipative transport in BEC
- ✦ Artificial gauge fields
- ✦ Resonant Fermi-Gases, Feshbach resonances, Efimov's states
- ✦ Quantum Monte-Carlo for many-body physics of ultra-cold gases
- ✦ Strongly interacting Fermi and Bose gases
- ✦ Ultra-cold gases out of equilibrium

Participation

Applicants from all countries that are members of the United Nations, UNESCO or IAEA may attend. As the School 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, and who are not more than 45 years old. 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?2348>. 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.

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

Organizers

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Carlos Sa de Melo
(Georgia Tech, Atlanta)

Andrea Perali
(University of Camerino)

Christophe Salomon
(ENS, Paris)

Local organizer

Mikhail Kiselev
(ICTP, Trieste)

Lecturers include

G. Shlyapnikov (Univ Paris Sud XI, France)
T. Giamarchi (Univ Geneva, Switzerland)
N. Prokofev (UMASS Amherst, USA)
H. Stoof (Utrecht Univ, The Netherlands)
C. Salomon (ENS Paris, France)
M. Olshanii (UMASS Boston, USA)
Z. Hadzibabic (Cambridge, UK)
R. Grimm (Innsbruck, Austria)

(and others to be confirmed)

DEADLINE

15 March 2012
(if requesting funds and/or
visa assistance)

15 April 2012
(if neither funds nor visa
assistance are requested)