



Summer School on Novel Quantum Phases and Non-equilibrium Phenomena in Cold Atomic Gases

27 August - 7 September 2007

Miramare-Trieste, Italy

In the last few years, experimentalists in the field of cold atomic gases have made astonishing progress in manipulating cold atoms. Thus, interaction strengths have been tuned via Feshbach resonances, optical lattices and microchip traps have been employed to control the geometry and dimensionality of degenerate quantum gases of both bosons and fermions. With this comprehensive degree of tunability, new interaction-driven states of matter have been created, such as the Mott insulator, the Tonks-Girardeau gas, and many others have been predicted. Furthermore, the system parameters can be varied as a function of time, which opens the possibility to explore non-equilibrium phenomena in a variety of quantum phases of matter.

This School intends to provide basic training to young scientists already working, or interested in working, in this rapidly developing field. It also has the goal of bringing together researchers from different backgrounds (atomic physics, nuclear physics, quantum optics, condensed matter physics, etc.), to facilitate the exchange of ideas and try to establish a common language and conceptual framework. Finally, the School will also report on the latest experimental and theoretical developments, as well as open problems, to take participants to the cutting-edge of the fields. Invited lectures will be followed by discussions and poster sessions.

Among others, the following topics will be discussed:

- * **Novel strongly correlated quantum states/phases in optical lattices**
- * **Low-dimensional systems of cold atoms**
- * **BCS to BEC Crossover and Fermion superfluidity**
- * **Transport and non-equilibrium phenomena**
- * **Systems with many hyperfine degrees of freedom and mixtures of cold gases**
- * **Systems with long range (dipolar) interaction**
- * **Rotating cold atomic gases and related Quantum Hall effects**
- * **Links to Quantum Information Theory**

The participants are selected typically from young applicants – starting from Ph.D students – but applications from senior scientists are also considered. Scientists from all countries, which are members of the UN, UNESCO or IAEA, may attend the School. The main purpose of the Centre is to help researchers from developing countries, within a framework of international cooperation; however, scientists from developed countries are also welcome to attend. Since ICTP activities are conducted in English, participants should have an adequate working knowledge of this language.

As a rule, travel and subsistence expenses of participants should be borne by their home institution. However, limited funds are available for some participants who are nationals of, and working in, a developing country. **There is no registration fee.**

Interested participants should fill in and submit the [Online Application Form](http://agenda.ictp.it/smr.php?1859) that can be found at: <http://agenda.ictp.it/smr.php?1859> and attach a c.v. and research abstract mentioning poster title. Kindly send all file attachments in Word or Acrobat format.

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INVITED SPEAKERS

INCLUDE:

- I. Bloch** (Univ. Mainz)
- J. Cardy** (Univ. Oxford)
- J. Dalibard** (ENS Paris)
- T. Giamarchi** (Univ. Geneva)
- V. Gurarie** (Univ. Colorado, Boulder)
- T.L. (Jason) Ho** (Ohio State Univ.)
- W. Hofstetter** (Univ. Frankfurt)
- R. Hulet** (Rice Univ.)
- M. Inguscio** (Univ. Florence)
- M. Lewenstein** (ICFO, Barcelona)
- A. Muramatsu** (Univ. Stuttgart)
- Q. Niu** (Univ. Texas at Austin)
- T. Pfau*** (Univ. Stuttgart)
- M. Raizen** (Univ. Texas at Austin)
- M. Randeria** (Ohio State Univ.)
- U. Schollwoeck** (RWTH Aachen)
- G. Shlyapnikov** (Univ. Paris-Sud XI)
- H. Stoof** (Univ. Utrecht)
- M. Ueda** (Tokio Inst. Technology)

*t.b.c.

DEADLINE

for requesting participation

31 January 2007