



The Abdus Salam  
**International Centre  
for Theoretical Physics**



## Workshop on Ultracold Atoms and Gauge Theories

Organizer(s): J. Dalibard (ENS, Paris), M. Lewenstein (ICFO, Barcelona), G. Mussardo (SISSA, Trieste), C. Sa de Melo (Georgia Tech, Atlanta), A. Trombettoni (CNR-IOM DEMOCRITOS & SISSA, Trieste). ICTP Local Organizer: M. Mueller

Trieste - Italy, 13 - 17 May 2013

**Venue: Leonardo da Vinci Building Main Lecture Hall**

### Programme

**MONDAY** (Room:Leonardo da Vinci Building Main Lecture Hall)

**13 May 2013**

- 08:30 - 09:50** --- REGISTRATION ---  
Registration of participants outside the Main Lecture Hall (Leonardo da Vinci Building, Main Entrance level), and administrative/financial matters
- 09:50 - 10:00** **Welcome address**
- 10:00 - 10:40** **Jing Zhang / Shanxi University**  
**Experimental realization of spin-orbit coupled degenerate Fermi gas**
- 10:40 - 11:20** **Daniel Greif / ETH Zürich**  
**Exploring artificial quantum-many body systems with ultracold fermions in a tunable-geometry optical lattice**
- 11:20 - 11:50** --- Coffee break ---
- 11:50 - 12:30** **Nathan Goldman / Université Libre de Bruxelles**  
**Imaging Topological States in Ultracold Atomic Gases**
- 12:30 - 13:10** **Pasquale Calabrese / Università di Pisa**  
**Quantum quenches in one dimensional systems**

- 13:10 - 15:00 --- Lunch break ---
- 15:00 - 15:40 **M. Zahid Hasan** / *Princeton University*  
**Topological Insulators and Superconductors**
- 15:40 - 16:20 **Miguel Angel Martín-Delgado** / *Universidad Complutense Madrid*  
**Topological Insulators under Quantum Dissipative Dynamics**
- 16:20 - 16:50 --- Coffee break ---
- 16:50 - 17:30 **Egor Babaev** / *KTH Stockholm*  
**Paired phases in  $U(1)\times U(1)$  gauge theories**

**TUESDAY** (Room:Leonardo da Vinci Building Main Lecture Hall)

14 May 2013

- 09:00 - 09:40 **Vincenzo Savona** / *EPFL Lausanne*  
**Quantum correlations in driven-dissipative arrays of weakly nonlinear optical cavities**
- 09:40 - 10:20 **Jacob M. Taylor** / *NIST & University of Maryland*  
**Quantum Hall physics with light**
- 10:20 - 11:00 **Iacopo Carusotto** / *INO-BEC and Università di Trento*  
**Quantum fluids of light under synthetic gauge fields**
- 11:00 - 11:30 --- Coffee break ---
- 11:30 - 12:10 **Lev Pitaevskii** / *INO-CNR BEC and Università di Trento*  
**First and second sound in Fermi gas at unitarity**
- 12:10 - 12:50 **Hui Zhai** / *Tsinghua University*  
**Exotic Superfluid in Ultracold Atomic Gases from Synthetic Gauge Fields**
- 12:50 - 15:00 --- Lunch break ---
- 15:00 - 15:40 **Jürgen Berges** / *University of Heidelberg*  
**Gauge fields far from equilibrium**
- 15:40 - 16:20 **Massimo Mannarelli** / *INFN Laboratori Nazionali del Gran Sasso*  
**Ultracold color superconductors**
- 16:20 - 16:50 --- Coffee break ---
- 16:50 - 17:30 **Mukund Rangamani** / *Durham University*  
**The holographic master field**
- 17:30 - 18:10 **Veronika Hubeny** / *Durham University*  
**Holographic Entanglement Entropy & Causal Holographic Information**
- 18:30 - 20:00 **POSTER SESSION**  
Outside the Main Lecture Hall (in the Poster Gallery, and Lobby)

**WEDNESDAY** (Room:Leonardo da Vinci Building Main Lecture Hall)

15 May 2013

- 09:00 - 09:40 **Tariq Yefsah / MIT Cambridge**  
**Spin-Orbit Coupling and Heavy Solitons in Fermi Gases**
- 09:40 - 10:20 **Arun Paramekanti / University of Toronto**  
**Accessing strongly correlated atomic states and probing atom currents in synthetic gauge fields**
- 10:20 - 11:00 **Luca Salasnich / Università di Padova**  
**BCS-BEC crossover with Rashba and Dresselhaus couplings**
- 11:00 - 11:30 --- Coffee break ---
- 11:30 - 11:55 **G.S. Singh / Indian Institute of Technology Roorkee**  
**Effect of synthetic spin-orbit coupling on statistical interactions in atomic quantum gases**
- 11:55 - 12:20 **Yun Li / INO-CNR BEC and Università di Trento**  
**Superstripes and the excitation spectrum of a spin-orbit-coupled BEC**
- 12:20 - 12:20 --- Lunch, and free afternoon ---
- 19:30 - 20:30 --- Reception for all participants ---

**THURSDAY** (Room:Leonardo da Vinci Building Main Lecture Hall)

16 May 2013

- 09:00 - 09:40 **Maciej Lewenstein / ICFO Barcelona**  
**Quantum Simulators of Lattice Gauge Theories**
- 09:40 - 10:20 **Fabrice Gerbier / ENS Paris**  
**Artificial gauge fields for neutral atoms in optical lattices**
- 10:20 - 11:00 **Benjamin Stuhl / NIST and University of Maryland**  
**TBA**
- 11:00 - 11:30 --- Coffee break ---
- 11:30 - 12:10 **Patrik Öhberg / Heriot-Watt University**  
**Simulating an interacting gauge theory with ultracold Bose gases**
- 12:10 - 12:50 **Enrique Rico Ortega / Institute for Quantum Information Processing, Ulm**  
**Atomic Quantum Simulation of U(N) and SU(N) Non-Abelian Lattice Gauge Theories**
- 12:50 - 15:00 --- Lunch break ---
- 15:00 - 15:40 **Benni Reznik / Tel Aviv University**  
**Simulation of dynamic abelian and non-abelian gauge theories with ultracold atoms**
- 15:40 - 16:05 **Andrey Kolovskiy / Kirensky Institute of Physics, Krasnoyarsk**  
**Landau-Stark states for cold atoms in a parabolic lattice**
- 16:05 - 16:30 **Christina Kraus / IQOQI Innsbruck**  
**An AMO toolbox for Majorana Fermions in Optical Lattices**

16:30 - 17:00 --- Coffee break ---

**FRIDAY** (Room:Leonardo da Vinci Building Main Lecture Hall)

**17 May 2013**

**09:00 - 09:40**     **Leonardo Fallani** / *LENS Firenze*  
**Quantum simulation with two-electron Fermi gases in optical lattices**

**09:40 - 10:20**     **Karyn Le Hur** / *Ecole Polytechnique Palaiseau*  
**Topological Insulators, Mott physics and Artificial Gauge Fields**

**10:20 - 11:00**     **Michele Burrello** / *Lorentz Institute, Leiden*  
**Two-dimensional arrays of Parafermionic zero modes**

**11:00 - 11:30**     --- Coffee break ---

**11:30 - 12:10**     **Kareljian Schoutens** / *University of Amsterdam*  
**Symmetries of spin-orbit coupled particles**

**12:10 - 12:20**     **Closing remarks**