

## Princeton Center for Theoretical Science

The Princeton Center for Theoretical Science is dedicated to exploring the frontiers of theory in the natural sciences. Its purpose is to promote interaction among theorists and seed new directions in research, especially in areas cutting across traditional disciplinary boundaries.

The Center is home to a corps of Center Postdoctoral Fellows, chosen from nominations made by senior theoretical scientists around the world. A group of senior Faculty Fellows, chosen from science and engineering departments across the campus, are responsible for guiding the Center. Center activities include focused topical programs chosen from proposals by Princeton faculty across the natural sciences. The Center is located on the fourth floor of Jadwin Hall, in the heart of the campus "science neighborhood". The Center hopes to become the focus for innovation and cross-fertilization in theoretical natural science at Princeton.

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David Huse  
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To find out more about Center Postdoctoral Fellowships and Programs see:

<http://pcts.princeton.edu/pcts>



# Nonequilibrium Phenomena in Ultra-cold Atoms and Strongly Interacting Photons

**11-13 June 2012**

**Room 407 Jadwin Hall**

### Program Organizers

Andrew Houck, David Huse, Marco Schiro', Hakan Tureci

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Princeton Center for Complex Materials and  
ITAMP, Harvard University**

## Nonequilibrium Phenomena in Ultra-cold Atoms and Strongly Interacting Photons

### Monday, 11 June 2012

8:45 am **Welcoming Remarks**

9:00 – 9:45 "From Quantum Magnetism to Quantum Quenches - Probing Non-Equilibrium Dynamics using Ultracold Atoms"  
**Immanuel Bloch, Munich**

10:00 – 10:45 "Ramsey interference as a probe of synthetic condensed matter systems"  
**Eugene Demler, Harvard University**

11:00 – 11:30 **Coffee Break**

11:30 – 12:15 "Geometric response and universality of slow dynamics in driven systems"  
**Anatoli Polkovnikov, Boston University**

12:30–2:30 pm **Lunch at PCTS**

2:30 – 3:15 "Strongly Interacting Fermi Gases: Thermodynamics, Spin Transport, and Lower Dimensions"  
**Martin Zwierlein, MIT**

3:30 – 4:15 "Quantum Gases in Transition"  
**Tilman Esslinger, ETH**

4:30 – 5:00 **Coffee Break**

5:00 – 5:45 "Nonequilibrium classical and quantum phase transitions, supersmectics, and frustration via BECs in fully emergent and compliant optical lattices"  
**Benjamin Lev, Stanford University**

### Tuesday, 12 June 2012

9:00 – 9:45 "Quantum critical behavior in driven and strongly interacting Rydberg gases"  
**Hans Peter Buechler, Stuttgart**

10:00 – 10:45 "Quantum information, quantum optics and quantum many-body physics with Rydberg excitation blockade"  
**Klaus Moelmer, Aarhus**

11:00 – 11:30 **Coffee Break**

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### Tuesday, 12 June 2012 (continued)

11:30 – 12:15 "From pairwise to ensemble atomic interactions with Rydberg blockade"  
**Mark Saffman, University of Wisconsin**

12:30–2:30 pm **Lunch at PCTS**

2:30 – 3:15 "Polariton condensates in semiconductor microcavities: propagation and localization"  
**Jacqueline Bloch, LPN-CNRS**

3:30 – 4:15 "Quantum fluids of light: from non-equilibrium BEC and superfluid hydrodynamics to quantum Hall liquids"  
**Iacopo Carusotto, BEC, Trento**

4:30 **Poster Session**

5:00 – 7:30 **Reception & Poster Session at PCTS**

### Wednesday, 13 June 2012

9:00 – 9:45 "Quantum dynamics of strongly interacting spins and photons"  
**Mikhail Lukin, Harvard University**

10:00 – 10:45 "Measuring entanglement growth in quench dynamics of atoms in optical lattices"  
**Peter Zoller, Innsbruck**

11:00 – 11:30 **Coffee Break**

11:30 – 12:15 "Non-equilibrium physics of coupled cavity arrays"  
**Sebastian Schmidt, ETH**

12:30–2:00 pm **Lunch at PCTS**

2:00 – 2:45 "Quantum Phases and Nonequilibrium Dynamics in Circuit QED lattices"  
**Jens Koch, Northwestern University**

3:00 – 3:45 "Driven Dissipative Phases of Strongly Interacting Photons"  
**Michael Hartmann, Munich**

4:00 pm **Concluding remarks**