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To find out more about Center Postdoctoral Fellowships and Programs see: https://pcts.princeton.edu

Many-body Physics with Synthetic Quantum Systems

April 12-14, 2023

Organizers
Waseem Bakr
Sarang Gopalakrishnan
David Huse
Rhine Samajdar
Jeff Thompson
Lawrence Cheuk

Sponsored in part by the Princeton Quantum Initiative
Many-body Physics with Synthetic Quantum Systems

Wednesday, April 12, 2023
8:30-8:55 am  Check in and Light Breakfast

Session 1 (Chair: Sarang Gopalakrishnan)
9:00-9:10  Opening Remarks

9:10–9:45  Observing the effects of many measurements without post selection
  Ehud Altman (Berkeley)

9:45–10:20  Decoding and steering Monitored Dynamics
  Matthew Fisher (UCSB)

10:20-11:00  Coffee Break

11:00–11:35  Error mitigation thresholds in noisy quantum circuits
  Michael Gullans (Maryland)

11:35–12:10  Gauge dualities for (good) LDPC codes and connections to local testability
  Vedika Khemani (Stanford)

12:10-2:00  Lunch Break

Session 2 (Chair: Jeff Thompson)
2:00 - 2:35  Exploring new scientific frontiers with programmable quantum systems
  Misha Lukin (Harvard)

2:35-3:10  Bethe phantom states in spin chains, and dipolar bilayers
  Wolfgang Ketterle (MIT)

3:10-4:00  Coffee Break

4:00-4:35  Thermalization of large bosonic quantum many-body systems under the microscope
  Monika Aidelsburger (LMU)

4:35-5:10  Quantum simulation with high entanglement entropy
  Manuel Endres (Caltech)

5:30 - 6:30  Reception at PCTS

Many-body Physics with Synthetic Quantum Systems

Thursday, April 13, 2023
8:00-8:30 am  Light Breakfast

Session 3 (Chair: Rhine Samajdar)
8:30–9:05  Exact Quantum Algorithms to Recognize Quantum Phases of Matter
  Soonwon Choi (MIT)

9:05-9:40  Random insights into the complexity of tensor network calculations
  Andrew Potter (UBC)

9:40-10:15  Complete quantum ergodicity: total exploration of the Hilbert space in dynamics
  Wenwei Ho (National University of Singapore)

10:15-11:00  Coffee Break

11:00–11:35  Extending the Hubbard Model - Fractional Quantum Hall Physics, Dipolar Quantum Solids and Frustrated Quantum Magnets
  Markus Greiner (Harvard)

11:35–12:10  Non-equilibrium quantum dynamics on a NISQ processor
  Pedram Roushan (Google)

12:10-1:45  Lunch

Session 4 (Chair: Waseem Bakr)
1:45-2:20  A Universal Theory for Scalable Spin Squeezing
  Norm Yao (Harvard)

2:20-2:55  Magnetism and spin squeezing using arrays of Rydberg atoms
  Antoine Browaeys (CNRS)

2:55-3:30  Towards new frontiers of quantum science with dual-species atom arrays
  Giulia Semeghini (Harvard)
Many-body Physics with Synthetic Quantum Systems  
Thursday, April 13, 2023 (cont.)

3:30-4:00 Coffee Break

4:00-5:00 Physics Department Hamilton Colloquium  
Room A-10, Jadwin Hall  
New avenues for Quantum simulations with atoms, molecules and photons.  
Immanuel Bloch (MPQ)

Friday, April 14, 2023
8:00-8:30 am Light Breakfast

Session 5 (Chair: Zoe Yan)
8:30-9:05 Making & Probing Photon Fluids and Solids  
Jon Simon (Stanford)

9:05-9:40 Topological phases with Rydberg atoms  
Hans Peter Buchler (Stuttgart)

9:40-10:15 Non-equilibrium 1D Gases  
David Weiss (Penn State)

10:15-11:00 Coffee Break

11:00-11:35 TBA  
Christian Roos (Innsbruck)

11:35-12:10 Degenerate Fermi gases of microwave-shielded polar molecules  
Xinyu Luo (MPQ)

12:10-1:45 Lunch

Session 6 (Chair: Lawrence Cheuk)
1:45-2:20 Exploiting disorder to probe many-body dynamics in dense spin systems  
Paola Capellaro (MIT)

2:20-2:55 Fermion pairing, charge order and magnetization in an attractive Fermi-Hubbard gas  
Martin Zwierlein (MIT)

2:55-3:30 Topological pumping into strongly correlated prethermal states  
Ben Lev (Stanford)