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 and is celebrating its tenth anniversary in 2016.

Faculty Fellows
Paul Steinhardt, Director
Igor Klebanov, Associate Director
Andrei Bernevig
Curtis Callan
Pablo Debenedetti
Eve Ostriker
Howard Stone
Herman Verlinde
Ned Wingreen

Center Postdoctoral Fellows
Barry Bradlyn 2015-2018
Jennifer Cano 2015-2018
Anna Frishman 2016-2019
Anna Ijjas 2014-2017
Bruno Le Floch 2015-2018
Daniel Lecoanet 2016-2019
Zhiyuan Li 2015-2108
Mark Mezei 2014-2017
Titus Neupert 2013-2016
David Pinner 2014-2017
Pierre Ronceray 2016-2019
Curt von Keyserlingk 2014-2017
Yaojun Zhang 2015-2018

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

“Hyperuniform State of Matter in Physics, Mathematics and Biology”

14-16 December 2016
Jadwin Hall, Room 407

Workshop Organizers
Paul Steinhardt
Salvatore Torquato
Hyperuniform State of Matter in Physics, Mathematics and Biology
All talks will be 40 minutes with 10 minutes for questions, unless otherwise indicated.

**Wednesday, December 14, 2016**

8:45 Coffee/welcome

Session Chair: Paul Steinhardt
9:00-10:00 "Hyperuniform States of Matter: Overview and Progress Report"
Salvatore Torquato, Princeton University

10:00-10:20 Coffee Break

10:20-11:10 "Hyperuniformity in determinantal and other quantum point processes"
Antonello Scardicchio, ICTP via video conference

11:10-12:00 "Enhanced Pinning For Vortices in Hyperuniform Substrates and Emergent Hyperuniform Vortex States"
Cynthia Reichhardt, Los Alamos National Laboratory

12:00-1:30 Lunch at PCTS, Jadwin Hall, Fourth Floor

Session Chair: Henry Cohn
1:30-2:20 "Microscopic description of Coulomb-type systems"
Sylvia Serfaty, Courant Institute

2:20-3:10 "Photonic Band Gaps in Hyperuniform Disordered Materials"
Marian Florescu, Surrey

3:10-3:30 Coffee break

3:30-4:20 "Hyperuniformity in maximally random jammed packings of hard particles and photoreceptor patterns in avian retina"
Yang Jiao, Arizona State University

4:20-5:10 "Hyperuniformity of quasicrystals and substitution tilings"
Josh Socolar, Duke University

**Thursday, December 15, 2016**

Session Chair, Roberto Car
9:00-9:50 "Assembling hyperuniform materials"
Remi Dreyfus, University of Pennsylvania

9:50-10:40 "Jam packed: Optimal molecular sensing in the immune and olfactory systems"
Vijay Balasubramanian, University of Pennsylvania

10:40-11:00 Coffee Break

11:00-11:50 "Experimental Realization and Characterization of Hyperuniform Disordered Photonic Structures"
Weining Man, SFSU

11:50-1:00 Lunch at PCTS, Jadwin Hall, Fourth Floor

Session Chair: Sylvia Serfaty
1:00-1:50 "Structural properties of high-dimensional sphere packings"
Henry Cohn, Microsoft Theory

1:50-2:40 "Hyperuniformity on the sphere"
Peter Grabner, Graz

2:40-3:10 Hyperuniformity Challenge

3:10-4:30 Poster Session and Coffee

**Friday, December 16, 2016**

Session Chair: Weining Man
9:00-9:50 "Random Organization and Hyperuniformity"
Paul Chaikin, NYU

9:50-10:40 "Hyperuniformity from non-equilibrium dynamics"
Daniel Hexner, University of Chicago

10:40-11:00 Coffee Break

11:00-11:50 "Experimental and numerical studies of photonic hyperuniform networks in two and three dimensions"
Frank Scheffold, Fribourg

11:50-12:40 "Are the spongy color-producing keratin nanostructures of bird feathers hyperuniform?"
Richard Prum (speaker) and Vinodkumar Saranathan
Yale-NUS, Singapore

12:40 Conclusion and Lunch at PCTS