

## 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.

### Faculty Fellows

Igor Klebanov, Director  
Ned Wingreen, Associate Director  
Jeremy Goodman  
Duncan Haldane  
Andrej Košmrlj  
Mariangela Lisanti  
Frans Pretorius  
Silviu Pufu  
Eliot Quataret  
Shinsei Ryu

### Center Postdoctoral Fellows

Vir Bulchandani 2020-2023	Minjae Cho 2021-2024
Giorgio Cipolloni 2021-2024	Scott Collier 2020-2023
Trevor GrandPre 2022-2024	David Hosking 2022-2025
Brooke Husic 2020-2023	Jonah Kudler-Flam 2022-2025
Yves Kwan 2022-2025	Alejandro Martinez-Calvo 2021-2024
Elias Most 2020-2023	Anirudh Prabhu 2022-2025
Carolyn Raithel 2020-2023	Samajdar Rhine 2022-2025
Frank Schindler 2020-2023	Nicole Shibley 2021-2024

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



## Positivity

November 7-9, 2022

Room 407, Jadwin Hall  
(PCTS Seminar Room)

### Organizers

Amir Ali Ahmadi  
Minjae Cho  
Scott Collier  
Silviu Pufu

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SIMONS FOUNDATION

## Positivity

### Monday, November 7, 2022

- 9:00 Light Breakfast  
9:25-9:30 Welcome and Introductions
- 9:30-10:30 Positivity and the Bootstrap  
**David Poland**
- 10:30-11:00 Coffee break
- 11:00-12:00 SDP and Positivity: polynomials and beyond  
**Pablo Parrilo**
- 12:00-1:30 Lunch at PCTS
- 1:30-2:20 Reduced Density Matrices, Positivity, and the Sum of Squares  
**David Mazziotti**
- 2:40-3:30 Questions and algorithms for the conformal bootstrap  
**Balt van Rees**
- 3:30-3:50 Coffee Break
- 3:50-4:40 Quantum Entanglement and Moment Problems  
**Greg Blekherman**
- 5:00 Reception for everyone at PCTS

### Tuesday, November 8, 2022

- 8:30 Light Breakfast
- 9:00-9:50 Analyzing Sum-of-Squares for Random k-SAT via Kikuchi Matrices and Applications to Extremal Combinatorics  
**Pravesh Kothari**
- 10:10-11:00 Bootstrapping the Ising Model on the Lattice  
**Victor Rodriguez**
- 11:00-11:30 Coffee break
- 11:30-12:20 Using polynomial optimization to study nonlinear dynamics of ODEs and PDEs  
**David Goluskin**
- 12:20-1:40 Lunch at PCTS

## Positivity

### Tuesday, November 8, 2022 (cont.)

- 1:40-2:30 Quantum relative entropy optimization  
**Hamza Fawzi**
- 2:50-3:40 Two applications of positivity to the theory of strong interactions (QCD)  
**Martin Kruczenski**
- 3:40-4:00 Coffee Break
- 4:00-5:00 Department of Physics Colloquium; Room A-10 Jadwin Hall  
Positivity constraints on theory space  
**Leonardo Rastelli**
- 4:30-5:30 ORFE Department Colloquium: Sherrerd Hall Room 101  
Performance analysis of sums of squares approximations in polynomial optimization  
**Monique Laurent**

### Wednesday, November 9, 2022

- 8:30 Light Breakfast
- 9:00-9:50 Spectra of hyperbolic manifolds and the conformal bootstrap  
**Dalimil Mazac**
- 10:10-11:00 Detecting quantum entanglement using polynomial optimization  
**Monique Laurent**
- 11:20-12:10 Semidefinite programming in Cryo-EM  
**Amit Singer**
- 12:10 Lunch at PCTS