

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	Rhine Samajdar 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>



Physics for Neural Networks

April 17-19, 2023
Room 407 Jadwin Hall, PCTS

Organizers

William Bialek
Giorgio Cipolloni
Boris Hanin
Francesca Mignacco

Physics for Neural Networks

Monday, April 17, 2023

- 9:30 Coffee/Refreshments
9:50-9:55 **Welcome and Introductions**
- 9:55-10:50 *Bayesian Interpolation with Deep Linear Networks*
Boris Hanin
- 10:50-11:05 **Coffee break**
- 11:05-12:00 *Learning time-scales in two-layers neural networks*
Andrea Montanari
- 12:00-12:55 *Universality and Non-Universality in Nonlinear Neural Networks*
Lucas Benigni
- 12:55-3:00 **Lunch at PCTS and Free time**
- 3:00-3:55 *Neural Tangent Hierarchy and Implicit Bias*
Jiaoyang Huang
- 4:00 **Poster session and Reception for everyone at PCTS**

Tuesday, April 18, 2023

- 8:30 **Light Breakfast**
- 9:00-9:55 *Learning neural nets with neural nets*
Florent Krzakala
- 9:55-10:50 *Deep learning theory beyond the kernel limit*
Cengiz Pehlevan
- 10:50-11:05 **Coffee break**
- 11:05-12:00 *The Gaussian world is not enough - when, how and what do neural networks learn from higher-order statistics?*
Sebastian Goldt

Physics for Neural Networks

Tuesday, April 18, 2023, cont.

- 12:00-12:55 *Consideration about uncertainty estimation in neural networks*
Lenka Zdeborová
- 12:55-2:00 **Lunch at PCTS**
- 2:00-2:55 *Effective Theory of Deep Neural Networks*
Sho Yaida
- 2:55-3:10 **Coffee break**
- 3:10-4:05 *Kernel Ridge Regression with Infinite-Width Neural Networks on Millions of Examples*
Ben Adlam

Wednesday, April 19, 2023

- 8:30 **Light Breakfast**
- 9:00-9:55 *Towards Understanding Adversarial Robustness*
Julia Kempe
- 9:55-10:50 *High dimensional dynamics of first order algorithms through iterative Gaussian conditioning*
Cédric Gerbelot
- 10:50-11:05 **Coffee break**
- 11:05-12:00 *Feature learning in DNNs: An adaptive GP approach*
Ringel Zohar
- 12:00 **Conclusion and Lunch at PCTS**