

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
Andrei Bernevig
Jeremy Goodman
Duncan Haldane
Andrej Košmrlj
Mariangela Lisanti
Frans Pretorius
Silviu Pufu
Eliot Quataret
Shinsei Ryu

Center Postdoctoral Fellows

Ashley Bransgrove 2023-2026
Giorgio Cipolloni 2021-2024
Mina Himwich 2023-2026
Jonah Kudler-Flam 2022-2025
Alejandro Martinez-Calvo 2021-2024
Rhine Samajdar 2022-2025
Simon Olivier 2023-2026
Nicole Shibley 2021-2024

Minjae Cho 2021-2024
Trevor GrandPre 2022-2024
David Hosking 2022-2025
Yves Kwan 2022-2025
Anirudh Prabhu 2022-2025
Colin Scheibner 2023-2026
Pok Man Tam 2023-2026

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



Bacteria versus Phage: The Main Event

January 10-12, 2024

Organizers

Grace Beggs
Sujit Datta
Ofer Kimchi
Victoria Muir
Ned Wingreen

Supported in part by
LSI, MRSEC, and MOL

Bacteria versus Phage: The Main Event

All talks are 20 min + 10 min Q&A

Wednesday, January 10, 2024

- 8:45 Coffee & light breakfast at PCTS
8:55-9:00 Welcome/Introduction, **Sujit Datta**

Session I: Phages in the real world

- 9:00-9:30 **Antoni Luque Santolaria, University of Miami**
Dynamic regimes and tipping points in phage-bacteria systems
- 9:30-10:00 **Britt Koskella, UC Berkeley**
Beyond pairwise interactions: how phages impact and are impacted by microbial communities
- 10:00-10:30 **Paul Turner, Yale University**
Quantitative biology meets phage-bacteria coevolution

10:30-11:00 Break

Session II: Phage-bacteria interactions at the molecular/cell scale

- 11:00-11:30 **Karen Maxwell, University of Toronto**
Pseudomonas prophages exploit bacterial signaling to modulate phage defence
- 11:30-12 **Grace Beggs, Princeton University**
Inter-domain chemical communication between bacteria and phages
- 12:00-1:30 Lunch at PCTS
- 1:30-2:00 **Luciano Marraffini, Rockefeller University**
CRISPR-CARF: sacrificing the host for the benefit of the population
- 2:00-2:30 **Bruce Levin, Emory University**
CRISPR-Cas mediated immunity and the population dynamics of lytic phage
- 2:30-3:00 Break
- 3:00-3:30 **Michael Laub, MIT**
How do bacteria sense phage infection?

Bacteria versus Phage: The Main Event

Wednesday, January 10, 2024 (cont.)

- 3:30-4:00 **José Penadés, Imperial College, UK**
Decoding hidden mysteries of Phage-Inducible Chromosomal Islands and their impact on bacterial ecology and evolution

Session III: Lightning talks from poster presenters

- 4:00-5:00 Lightning Talks, TBA
5:00-7:00 Poster Session and Welcome Reception at PCTS

Thursday, January 11, 2024

8:45 AM. Coffee & light breakfast at PCTS

Session IV: Phage-bacteria interactions at the molecular /cell scale

- 9:00-9:30 **Birgit Scharf, Virginia Tech**
Infection mechanisms of flagellotropic phages
- 9:30-10:00 **Ido Golding, University of Illinois**
The view from the single phage: Recent findings and future directions
- 10:00-10:30 **Diana Fusco, University of Cambridge, UK**
Watching a phage infection one cell at a time: the role of stochasticity in phage evolution
- 10:30-11:00 Break

Session V: Phage-bacteria interactions at the population scale

- 11:00-11:30 **Joe Bondy-Denomy, UCSF**
Mechanisms for bacteriophages to evade anti-phage immunity
- 11:30-12 **Kim Sneppen, Niels Bohr Institute, Denmark**
Synthetic biology for vector borne diseases using phages and *E.coli*
- 12-1:30 Lunch at PCTS
- 1:30-2:00 **Carey Nadell, Dartmouth**
Spatial propagation of temperate phages within bacterial biofilm communities

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Thursday, January 11, 2024 (cont.)

Session V: Phage-bacteria interactions at the population scale (cont.)

- 2:30-2:30 **Joana Azeredo, University of Minho, Portugal**
Bacterial biofilms versus phages: implications and applications
- 2:30-3:00 **Break**
- 3:00-3:30 **Victoria Muir, Princeton University**
Death & chemotaxis: unraveling the dynamics of bacterial community migration in the presence of phages
- 3:30-4:00 **Joshua Weitz, University Maryland**
Winning is not everything: eco-evolutionary dynamics of phage and bacteria in the near- and long-term

Session VI: Breakout discussions

- 4:00-4:45 Breakout discussions + coffee
- 4:45-5:30 Summaries of breakout discussions

Friday, January 12, 2024

8:45 Coffee & light breakfast at PCTS

Session VII: Phages for medicine

- 9:00-9:30 **Graham Hatfull, University of Pittsburgh**
Mycobacteriophages: From Petri dish to patient
- 9:30-10:00 **Jay Hyun Jo & Waqas Chaudhry, Adaptive Phage Therapeutics**
Translating Phage Therapy to the Clinic: From Sewage to the Bedside
- 10:00-10:30 **Break**
- 10:30-11:00 **Andres Garcia, Georgia Tech**
Phage-delivering Biomaterials to Fight Bacterial Infections

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Friday, January 12, 2024 (cont.)

- 11:00-11:30 **Antonia Sagona, University of Warwick, UK**
Phage engineering towards phage therapy
- 11:30-11:45 Closing remarks, **Ned Wingreen**