Abhinav Prem

Curriculum Vitæ

Physics Program
Bard College
✉ *aprem@bard.edu*
Google Scholar
Citizenship: Indian/US Permanent Resident

Research Interests

- Topological states of matter and topological quantum field theories
- Non-equilibrium quantum dynamics
- Open quantum systems
- Quantum Error Correction

Research Experience & Employment

July 2025– **Assistant Professor of Physics**, *Bard College*.

2022–2025 **Member**, *Institute for Advanced Study*.
Postdoctoral fellow, Simons Collaboration on Ultra-Quantum Matter

2021–2022 **Associate Research Scholar/Lecturer**, *Princeton University*.

2018–2021 **Postdoctoral Fellow**, *Princeton Center for Theoretical Science*.

Education

2013–2018 **Ph.D. in Physics**, *University of Colorado at Boulder*.
Area of Study: Theoretical Condensed Matter Physics
Advisor: Dr. Victor Gurarie. *Co-advisor:* Dr. Rahul Nandkishore.
Thesis: "Aspects of topology in quantum phases of matter"

2009–2013 **B.S. in Physics (summa cum laude)**, *University of Southern California*.
Advisor: Dr. Vitaly Kresin

2009–2013 **B.A. in Mathematics (summa cum laude)**, *University of Southern California*.

Grants

2025– **Department of Energy, Office of Advanced Scientific Computing Research**.
Title: *Leveraging Novel Symmetries for Noise Resilient Topological Quantum Computation*
Contribution: Principal Investigator, with co-PI Stephan Haas (USC)
Total Grant Value: $500,000. Bard's share: $300,006

Honours & Awards

2023 **Excellence in Teaching Award**, *Princeton School of Engineering and Applied Science*.

2020–2022 **Visiting Fellow**, *Institute for Advanced Study*.

2020–2021 **John A. Wheeler Fellow**, *Princeton Center for Theoretical Science*.

Selected Publications

A complete list of publications is available on the arXiv.

1. P. Gorantla, **A. Prem**, N. Tantivasadakarn, & D. J. Williamson, *There and Back Again: A Gauging Nexus between Topological and Fracton Phases*, arXiv:2509.19440.
   (*All authors contributed equally to this work.)
2. P.-S. Hsin, R. Kobayashi, & **A. Prem**, *Higher-Form Anomalies Imply Intrinsic Long-Range Entanglement*, arXiv:2504.10569
3. S. Chirame, **A. Prem**, S. Gopalakrishnan, & F. Burnell, *Stabilizing Non-Abelian Topological Order against*

Heralded Noise via Local Lindbladian Dynamics, PRX Quantum **6**, 030363 (2025), arXiv:2410.21402.

4. S. Chirame, F. Burnell, S. Gopalakrishnan, & **A. Prem**, *Stable Symmetry-Protected Topological Phases in Systems with Heralded Noise*, Phys. Rev. Lett. **134**, 010403 (2025), arXiv:2404.16962
5. R. Sohal & **A. Prem**, *A Noisy Approach to Intrinsically Mixed-State Topological Order*, PRX Quantum **6**, 010313 (2025), **Viewpoint in Physics**, arXiv:2403.13879
6. D. Aasen, D. Bulmash, **A. Prem**, K. Slagle, & D. J. Williamson, *Topological Defect Networks for Fractons of all Types**, Phys. Rev. Research **2**, 043165 (2020), arXiv:2002.05166.
   (*All authors contributed equally to this work.)
7. **A. Prem*** & D. J. Williamson*, *Gauging permutation symmetries as a route to non-Abelian fractons,* SciPost Phys **7**, 068 (2019), arXiv:1905.06309.
8. A. Schmitz, S.-J. Huang, & **A. Prem**, *Entanglement Spectra of Stabilizer Codes: A Window into Gapped Quantum Phases,* Phys. Rev. B **99**, 205109 (2019), arXiv:1901.10486.
9. **A. Prem***, S.-J. Huang*, H. Song, & M. Hermele, *Cage-Net Fracton models,* Phys. Rev. X **9**, 021010 (2019), arXiv:1806.04687.
10. **A. Prem**, J. Haah, & R. Nandkishore, *Glassy quantum dynamics in translational invariant fracton models,* Phys. Rev. B **95**, 155133 (2017), arXiv:1702.02952.

Recent Invited Talks

2026 **Topological Order in Open Quantum Systems**.
Invited Seminar. International Centre for Theoretical Sciences, Bengaluru, India.

2025 **Topological Order in Noisy Quantum Systems**.
High Energy Theory Seminar. Institute for Advanced Study, Princeton, USA.
TSVP Seminar, Okinawa Institute of Science and Technology, Okinawa, Japan.
KITP Seminar, Kavli Institute for Theoretical Physics, Santa Barbara, USA.
Matter Seminar, Imperial College London, London, UK.

2025 **Quantum Many-Body Physics in the Noisy Era**.
Special Physics Seminar. University of Georgia, Athens, USA.
Physics Colloquium. University of Kentucky, Lexington, USA.
Physics Colloquium. University of Southern California, Los Angeles, USA.

2024 **Applications of Anyon Condensation: Topological Defect Networks**.
Condensed matter seminar. University of California, Los Angeles, Los Angeles, USA.

Teaching History

Fall 2025 – **Instructor**, *Bard College*,
PHYS 141: Introduction to Physics I, II.

Fall 2021 – **Instructor**, *Princeton University*,
Spring 2022 General Physics I, II.

Professional Services & Scientific Outreach

- Referee for Physical Reviews B, D, X, Letters, and Research, Nature Physics, Nature Communications Physics, New Journal of Physics, Journal of High Energy Physics, and SciPost.
- Reviewer for Quantum Information Processing Conference (QIP 2025).
- Organiser of a weekly seminar that fosters collaboration between condensed matter and high energy theorists.
- Co-organiser of the “Generalized Symmetries in Quantum Matter" program at the Okinawa Institute of Science and Technology.
- Co-organised 4 conferences at the Princeton Center for Theoretical Science and various seminars at Princeton.
- Co-organised the Princeton physics talk series aimed at undergraduates.
- Co-organised and participated as a mentor in the “Princeton Physics Mentorship" program.