

ZHEN BI

Assistant Professor of Physics · The Pennsylvania State University

Room 338 Davey Lab, University Park, PA 16802 · +1 (805) 708-4987 · zjb5184@psu.edu

[Google Scholar](#) · ORCID: [0000-0003-0351-3963](#) · Website: bizhen01.github.io/zhenbi-group

Education

2012–2017 Ph.D., Physics, University of California, Santa Barbara. Thesis advisor: Prof. Cenke Xu.
2008–2012 B.Sc., Physics, Peking University.

Professional Experience

2020– Assistant Professor, The Pennsylvania State University.
2017–2020 Pappalardo Fellow, Massachusetts Institute of Technology.
Mentors: Prof. T. Senthil, Prof. Liang Fu.
2022 Fall C.-N. Yang Visiting Fellow, The Chinese University of Hong Kong.

Honors and Awards

2024–2029 NSF CAREER Award.
Title: Facets of Gapless Quantum Matter: New Phenomena, New Tools, and New Platforms
2022 C.-N. Yang Visiting Fellow, Chinese University of Hong Kong.
2020 Kadanoff Fellowship, University of Chicago (declined).
2017–2020 Pappalardo Fellowship, MIT.
2017 Outstanding Teaching Assistant Award, UCSB.
2016 Dissertation Fellowship, UCSB.
2012 Herbert P. Broida Fellowship, UCSB.
2009 First Prize Scholarship, Peking University.
2008 Gold Medal, 39th International Physics Olympiad.

Professional Memberships

American Physical Society (APS)
American Association for the Advancement of Science (AAAS)
Sigma Xi, The Scientific Research Honor Society

RESEARCH

My independent research program at Penn State concentrates on three directions:

1. **Mixed-state phases of quantum matter.** Topological order and symmetry protection in open systems away from equilibrium — average symmetry-protected topological phases, strong-to-weak spontaneous symmetry breaking, and their information-theoretic diagnostics.
2. **Quantum matter with generalized symmetry.** Consequences of dipolar, subsystem, and modulated symmetries — fractonic higher-order topological phases, dipole-symmetry-breaking-driven non-Fermi liquids and modulated-symmetry SPTs and LSM theorems.
3. **Correlated and topological phases in moiré materials.** Flat-band and interaction engineering in twisted 2D materials — excitonic density waves, the fractional quantum anomalous Hall effects, and designed Kagome moiré superlattices.

More details can be found in the research statement.

Publications

Bibliometrics: h-index 28 · 3,422 total citations · i10-index 44 (Google Scholar, June 2026).

Published — Penn State (2021–present)

- [1] S. Srinivasan, J.H. Zhang, Y. Qi, **Z. Bi**, *Classification of Topological Superconductors with Average Crystalline Symmetries through a Generalized Real-Space Construction*. Phys. Rev. B 114, 014202 (2026)
- [2] J.H. Zhang, Y. Qi, **Z. Bi**, *Fidelity Strange Correlators for Average Symmetry-Protected Topological Phases*. Science Bulletin 71, 688–691 (2026)
- [3] S. Ding, J. Yao, **Z. Bi**, Q. Tran, B. Liu, Q. Li, S. Trolier-McKinstry, T. N. Jackson, Y. Liu, *Indirect Tunneling Enabled Spontaneous Time-Reversal Symmetry Breaking and Josephson Diode Effect in TiN/Al₂O₃/Hf_{0.8}Zr_{0.2}O₂/Nb Tunnel Junctions*. Phys. Rev. B 113, 134510 (2026)
- [4] A. Anakru, M. Gattu, A.C. Balram, X.C. Wu, P. Kumar, **Z. Bi**, J.K. Jain, *Emergent Gauge Field in Composite-Fermion Metals: A Large-Scale Microscopic Study*. Phys. Rev. Lett. 135, 246503 (2025)
- [5] R. Luo, Y.N. Wang, **Z. Bi**, *Topological Holography for Mixed-State Phases and Phase Transitions*. PRX Quantum 6, 040358 (2025)
- [6] X. Chen, F.J. Wang, **Z. Bi**, Z.D. Song, *Intrinsic (Axion) Statistical Topological Insulator*. Phys. Rev. Lett. 134, 226601 (2025)
- [7] S. Sun, J.H. Zhang, **Z. Bi**, Y. You, *Holographic View of Mixed-State Symmetry-Protected Topological Phases in Open Quantum Systems*. PRX Quantum 6, 020333 (2025)
- [8] C. Zhang, Y. Xu, J.H. Zhang, C. Xu, **Z. Bi**, Z.X. Luo, *Strong-to-Weak Spontaneous Breaking of 1-Form Symmetry and Intrinsically Mixed Topological Order*. Phys. Rev. B 111, 115137 (2025)
- [9] L. Lessa, R. Ma, J.H. Zhang, **Z. Bi**, M. Cheng, C. Wang, *Strong-to-Weak Spontaneous Symmetry Breaking in Mixed Quantum States*. PRX Quantum 6, 010344 (2025)
- [10] Y. Guo, J.H. Zhang, H.R. Zhang, S. Yang, **Z. Bi**, *Locally Purified Density Operators for Symmetry-Protected Topological Phases in Mixed States*. Phys. Rev. X 15, 021060 (2025)
- [11] R.C. Ma, J.H. Zhang, **Z. Bi**, M. Cheng, C. Wang, *Topological Phases with Average Symmetries: the Decohered, the Disordered, and the Intrinsic*. Phys. Rev. X 15, 021062 (2025)
- [12] K. Yang, Z. Xu, Y. Feng, F. Schindler, Y. Xu, **Z. Bi**, B.A. Bernevig, P. Tang, C.X. Liu, *Topological Minibands and Interaction Driven Quantum Anomalous Hall State in Topological Insulator Based Moiré Heterostructures*. Nature Communications 15, 2670 (2024)
- [13] C. Xu, J. Li, Y. Xu, **Z. Bi**, Y. Zhang, *Maximally Localized Wannier Orbitals, Interaction Models and Fractional Quantum Anomalous Hall Effect in Twisted Bilayer MoTe₂*. Proc. Natl. Acad. Sci. 121, e2316749121 (2024)

- [14] Y. Guo, J. Zhang, **Z. Bi**, S. Yang, *Triggering Boundary Phase Transitions through Bulk Measurements in 2D Cluster States*. Phys. Rev. Research 5, 043069 (2023)
- [15] J.H. Zhang, K. Ding, S. Yang, **Z. Bi**, *Fractonic Higher-Order Topological Phases in Open Quantum Systems*. Phys. Rev. B 108, 155123 (2023)
- [16] A. Anakru, **Z. Bi**, *Non-Fermi Liquids from Dipolar Symmetry Breaking*. Phys. Rev. B 108, 165112 (2023)
- [17] J.H. Zhang, M. Cheng, **Z. Bi**, *Classification and Construction of Interacting Fractonic Higher-Order Topological Phases*. Phys. Rev. B 108, 045133 (2023)
- [18] J. May-Mann, Y. You, T.L. Hughes, **Z. Bi**, *Interaction-Enabled Fractonic Higher-Order Topological Phases*. Phys. Rev. B 105, 245122 (2022)
- [19] S.-K. Jian, Z.-C. Yang, **Z. Bi**, X. Chen, *Yang-Lee Edge Singularity Triggered Entanglement Transition*. Phys. Rev. B 104, L161107 (2021)
- [20] **Z. Bi**, L. Fu, *Excitonic Density Wave and Spin-Valley Superfluid in Bilayer Transition Metal Dichalcogenide*. Nature Communications 12, 642 (2021)

Submitted

- [21] A. Fedorko, C.X. Liu, **Z. Bi**, *Engineering Moiré Kagome Superlattices in Twisted Transition Metal Dichalcogenides*. Submitted to Phys. Rev. B (July 2025); arXiv:2503.13422.
- [22] Y.-M. Ding, Y. Guo, **Z. Bi**, Z. Yan, *Strong-to-Weak Spontaneous Symmetry Breaking in a (2+1)D Transverse-Field Ising Model under Decoherence*. Submitted to Phys. Rev. Lett. (April 2026); arXiv:2603.24342.
- [23] A. Anakru, L. Li, S. Srinivasan, **Z. Bi**, *Matrix Product States for Modulated Symmetries: SPT, LSM, and Beyond*. Submitted to Phys. Rev. Lett. (June 2026); arXiv:2603.19189.
- [24] M. Tian, **Z. Bi**, T. Iadecola, B. Gadway, *Dissipative Preparation of Correlated Quantum States in Dipolar Rydberg Arrays*. Submitted to Phys. Rev. Lett. (April 2026); arXiv:2604.18542.
- [25] Z. Chen, J. Li, L.-H. Hu, **Z. Bi**, R.-X. Zhang, *Intertwining Josephson and Vortex Topologies in Conventional Superconductors*. Submitted to Phys. Rev. X (April 2025); arXiv:2504.07066.

Preprints

- [26] L. Li, **Z. Bi**, W. Cao, *Generalized Symmetry-Protected Topological Phases in Mixed States from Gauging Dualities*. arXiv:2603.17282 (2026).
- [27] A. Anakru, **Z. Bi**, *Topological Phases and Phase Transitions with Dipolar Symmetry Breaking*. arXiv:2403.19601 (2024).
- [28] J.Y. Lee, W. Ji, **Z. Bi**, M. P. A. Fisher, *Decoding Measurement-Prepared Quantum Phases and Transitions: from Ising Model to Gauge Theory, and Beyond*. arXiv:2208.11699 (2022).

Published — Prior (Postdoctoral and Doctoral)

- [29] Z. Zheng, Q. Ma, **Z. Bi**, S. de la Barrera, M. Liu, N. Mao, Y. Zhang, N. Kiper, K. Watanabe, T. Taniguchi, J. Kong, W. Tisdale, R. Ashoori, N. Gedik, L. Fu, S. Xu, P. Jarillo-Herrero, *Unconventional Ferroelectricity in Moiré Heterostructures*. Nature 588, 71–76 (2020)
- [30] J. Han, P. Zhang, **Z. Bi**, Y. Fan, T.S. Safi, J. Xiang, J. Finley, L. Fu, R. Cheng, L. Liu, *Birefringence-Like Spin Transport via Linearly Polarized Antiferromagnetic Magnons*. Nature Nanotechnology 15, 563–568 (2020)
- [31] **Z. Bi**, E. Lake, T. Senthil, *Landau Ordering Phase Transitions beyond the Landau Paradigm*. Phys. Rev. Research 2, 023031 (2020)
- [32] H. Goldman, A. Thomson, L. Nie, **Z. Bi**, *Interplay of Interactions and Disorder at the Superfluid-Insulator Transition: A Dirty Two-Dimensional Quantum Critical Point*. Phys. Rev. B 101, 144506 (2020)
- [33] Y. You, **Z. Bi**, M. Pretko, *Emergent Fractons and Algebraic Quantum Liquid from Plaquette Melting Transitions*. Phys. Rev. Research 2, 013162 (2020)

- [34] V. Kozii, **Z. Bi**, J. Ruhman, *Superconductivity near a Ferroelectric Quantum Critical Point in Ultralow-Density Dirac Materials*. Phys. Rev. X 9, 031046 (2019)
- [35] D. Williamson, **Z. Bi**, M. Cheng, *Fractonic Matter in Symmetry-Enriched $U(1)$ Gauge Theory*. Phys. Rev. B 100, 125150 (2019), Editors' Suggestion
- [36] **Z. Bi**, N. Yuan, L. Fu, *Designing Flat Bands by Strain*. Phys. Rev. B 100, 035448 (2019), Editors' Suggestion
- [37] **Z. Bi**, T. Senthil, *An Adventure in Topological Phase Transitions in $3+1$ -D: Non-Abelian Deconfined Quantum Criticalities and a Possible Duality*. Phys. Rev. X 9, 021034 (2019)
- [38] C.M. Jian, **Z. Bi**, Y.-Z. You, *Lattice Construction of Duality with Non-Abelian Gauge Fields in $2+1$ D*. Phys. Rev. B 100, 075109 (2019)
- [39] **Z. Bi**, A. Grebe, G. Kanwar, P. Ledwith, D. Murphy, M. Wagman, *Lattice Analysis of $SU(2)$ with 1 Adjoint Dirac Flavor*. PoS LATTICE2019, 127 (2019); arXiv:1912.11723
- [40] M. Cheng, **Z. Bi**, Y.-Z. You, Z.C. Gu, *Classification of Symmetry-Protected Phases for Interacting Fermions in Two Dimensions*. Phys. Rev. B 97, 205109 (2018), Editors' Suggestion
- [41] C.M. Jian, A. Thomson, A. Rasmussen, **Z. Bi**, C. Xu, *Deconfined Quantum Critical Point on the Triangular Lattice*. Phys. Rev. B 97, 195115 (2018)
- [42] C.M. Jian, **Z. Bi**, C. Xu, *Lieb-Schultz-Mattis Theorem and Its Generalizations from the Perspective of the Symmetry-Protected Topological Phase*. Phys. Rev. B 97, 054412 (2018)
- [43] C.M. Jian, **Z. Bi**, C. Xu, *A Model for Continuous Thermal Metal to Insulator Transition*. Phys. Rev. B 96, 115122 (2017)
- [44] **Z. Bi**, C.M. Jian, Y.-Z. You, K. Pawlak, C. Xu, *Instability of the Non-Fermi Liquid State of the Sachdev-Ye-Kitaev Model*. Phys. Rev. B 95, 205105 (2017)
- [45] K. Slagle, **Z. Bi**, Y.-Z. You, C. Xu, *Out-of-Time-Order Correlation in Marginal Many-Body Localized Systems*. Phys. Rev. B 95, 165136 (2017)
- [46] **Z. Bi**, R.X. Zhang, Y.-Z. You, A. Young, L. Balents, C.X. Liu, C. Xu, *Bilayer Graphene as a Platform for Bosonic Symmetry Protected Topological States*. Phys. Rev. Lett. 118, 126801 (2017)
- [47] **Z. Bi**, Y.-Z. You, C. Xu, *Exotic Quantum Critical Point on the Surface of the Three-Dimensional Topological Insulator*. Phys. Rev. B 94, 024433 (2016)
- [48] Y.-Z. You, **Z. Bi**, D. Mao, C. Xu, *Quantum Phase Transitions between Bosonic Symmetry-Protected Topological States without Sign Problem: Nonlinear Sigma Model with a Topological Term*. Phys. Rev. B 93, 125101 (2016)
- [49] **Z. Bi**, C. Xu, *Construction and Field Theory of Bosonic Symmetry Protected Topological States beyond Group Cohomology*. Phys. Rev. B 91, 184404 (2015)
- [50] **Z. Bi**, A. Rasmussen, K. Slagle, C. Xu, *Classification and Description of Bosonic Symmetry Protected Topological Phases with Semiclassical Nonlinear Sigma Models*. Phys. Rev. B 91, 134404 (2015), Editors' Suggestion
- [51] Y.-Z. You, **Z. Bi**, A. Rasmussen, M. Cheng, C. Xu, *Bridging Fermionic and Bosonic Short-Range Entangled States*. New J. Phys. 17, 075010 (2015)
- [52] **Z. Bi**, Y.-Z. You, C. Xu, *Anyon and Loop Braiding Statistics in Field Theories with a Topological Θ -term*. Phys. Rev. B 90, 081110 (2014), Rapid Communication
- [53] Y.-Z. You, **Z. Bi**, A. Rasmussen, K. Slagle, C. Xu, *Wavefunction and Strange Correlator of Short-Range Entangled States*. Phys. Rev. Lett. 112, 247202 (2014)
- [54] **Z. Bi**, A. Rasmussen, C. Xu, *Line Defects in Three-Dimensional Symmetry Protected Topological Phases*. Phys. Rev. B 89, 184424 (2014)

Research Support

External / Federal

- **NSF CAREER: Facets of Gapless Quantum Matter — New Phenomena, New Tools, and New Platforms.** National Science Foundation, Division of Materials Research (Condensed Matter and Materials Theory), award DMR-2339319. Role: sole PI. Total award \$605,000. May 1, 2024 – April 30, 2029.

Internal (Penn State)

- **ICDS Quantum SuperSEED: Open Quantum Systems Beyond Markovianity — Building a Cross-Disciplinary Community for Quantum Simulation and Computing.** Penn State Institute for Computational and Data Sciences (ICDS). Role: PI; co-PIs: Thomas Iadecola, Xiantao Li, Sarah Shandera, and Chunhao Wang. \$200,000. December 2025 – December 2026.

Invited Talks

Invited Conference and Workshop Talks

1. *When Symmetry Holds Only on Average: Topology of Disordered and Decohered Matter* — Aspen Workshop “Emerging New Phases in Quantum Materials: The Disordered, the Strange, and the Topological,” Aspen Center for Physics, June 2026
2. *Strong-to-Weak Symmetry Breaking in Mixed Quantum States* — Q-PHORIA, Carnegie Mellon University, October 2025
3. *Average Crystalline Symmetry-Protected Topological Phases* — New Platforms for Topological Quantum Matter, University of Minnesota, May 2025
4. *Strong-to-Weak Symmetry Breaking in Mixed Quantum States* — Invited Talk, APS Global Summit, March 2025
5. *SymTFT Perspective on Mixed State Phases* — Simons Center for Geometry and Physics workshop “Quantum Information Dynamics and Non-Equilibrium Quantum Matter,” Stony Brook University, December 2024
6. *Fermionic Models with Spontaneous Dipolar Symmetry Breaking* — KITP Conference “Theories, Experiments and Numerics on Gapless Quantum Many-body Systems,” UC Santa Barbara, May 2024
7. *Classification and Characterization of Average Symmetry-Protected Topological Phases* — Q-PHORIA, Pittsburgh Quantum Institute, October 2023
8. *Symmetry-Protected Topological Phases under Measurement, Decoherence, or Disorder* — Croucher Summer Course “Quantum Entanglement and Topological Order,” Chinese University of Hong Kong, June 2023
9. *Classification and Characterization of Average Symmetry-Protected Topological Phases* — KITP Program “A Quantum Universe in a Crystal: Symmetry and Topology across the Correlation Spectrum,” KITP, Spring 2023
10. *Measurement-Prepared Quantum Phases and Phase Transitions* — GGI Workshop “Bootstrapping Nature: Non-perturbative Approaches to Critical Phenomena,” Florence, Italy, October 2022
11. *Invited Talk* — Recent Advances in Studies of Strongly Correlated Electrons, ICISE, Quy Nhon, Vietnam, June 2026 (declined — visa)
12. *Invited Talk* — Hong Kong Summit of Quantum Frontiers, Chinese University of Hong Kong, December 2025 (declined — visa)

Colloquia

13. *Invited Colloquium* — Northeastern University, December 2026
14. *Measurement-Prepared Quantum Phases and Phase Transitions* — Colloquium, Chinese University of Hong Kong, December 2022
15. *Designing Electronic Band Structure and Correlation in Moiré Superlattices* — Online Colloquium, Rensselaer Polytechnic Institute, November 2021
16. *Adventure in the Critical Landscape: Quantum Phase Transitions beyond the Landau Paradigm* — Online Colloquium, Boston College, October 2021

17. *Invited Colloquium* — Westlake University, China, 2025 (declined — visa)

Invited Seminars

18. *Invited Seminar* — Purdue University, November 2026
19. *Quantum Many-Body Topology in Mixed Quantum States* — Condensed Matter Seminar, Texas A&M University, November 2024
20. *Quantum Many-Body Topology in Mixed Quantum States* — Condensed Matter Seminar, University of Tennessee, Knoxville, November 2024
21. *Quantum Many-Body Topology in Mixed Quantum States* — Condensed Matter Seminar, Johns Hopkins University, October 2024
22. *Quantum Many-Body Topology in Mixed Quantum States* — Condensed Matter Seminar, University of Florida, April 2024
23. *Symmetry-Protected Topological Phases under Disorder or Decoherence* — ICQM, Peking University, July 2023
24. *Measurement-Prepared Quantum Phases and Phase Transitions* — Condensed Matter Seminar, IAS, Tsinghua University, June 2023
25. *Measurement-Prepared Quantum Phases and Phase Transitions* — Kadanoff Seminar, University of Chicago, 2023
26. *Measurement-Prepared Quantum Phases and Phase Transitions* — Condensed Matter Seminar, HKUST, November 2022
27. *Measurement-Prepared Quantum Phases and Phase Transitions* — Condensed Matter Seminar, Hong Kong University, November 2022
28. *Interaction-Enabled Higher-Order Topological Phases with Subsystem Symmetry* — Condensed Matter Seminar, Yale University, May 2022
29. *Designing Electronic Structure and Correlation in Moiré Superlattices* — Quantum Matter Seminar, Ohio State University, June 2020
30. *Designing Electronic Structure and Correlation in Moiré Superlattices* — Summer Colloquium Series, Penn State University, June 2020

Earlier — Postdoctoral and Doctoral (2016–2020)

1. *Odyssey in the Critical Landscape: Quantum Phase Transitions beyond the Landau Paradigm* — Condensed and Living Matter Seminar, University of Pennsylvania, February 2020
2. *Odyssey in the Critical Landscape: Quantum Phase Transitions beyond the Landau Paradigm* — CAMP Seminar, Penn State University, January 2020
3. *Novel Quantum Criticalities beyond the Landau-Ginzburg-Wilson-Fisher Paradigm* — Quantum Matter and QFT Seminar, Harvard University, October 2019
4. *Novel Quantum Criticalities beyond Landau's Paradigm* — Ultra-Quantum Matter Simons Collaboration Seminar, 2019
5. *Designing Flat Bands by Strain* — EPiQS Postdoctoral Symposium, Beverly, MA, June 2019
6. *Deconfined Quantum Critical Points in 3+1D and a Possible Duality* — Condensed Matter Seminar, Harvard University, November 2018
7. *Non-Abelian Deconfined Quantum Phase Transitions in 3+1D* — CMSA Kickoff Workshop on Topology and Quantum Phases of Matter, Harvard University, August 2018
8. *Deconfined Quantum Critical Point in 3+1D and a Possible Duality* — Condensed Matter Seminar, UCSB, March 2018
9. *Theory and Experimental Platform for Bosonic Symmetry Protected Topological Phases* — Condensed Matter Seminar, Harvard University, December 2016
10. *Theory and Experimental Platform for Bosonic Symmetry Protected Topological Phases* — Condensed Matter Seminar, Yale University, December 2016

11. *Theory and Experimental Platform for Bosonic Symmetry Protected Topological Phases* — Condensed Matter Seminar, Perimeter Institute, December 2016
12. *Bosonic Symmetry Protected Topological States: Theory, Numerics, and Experimental Platform* — KITP Conference: Topological Quantum Matter, UCSB, October 2016

TEACHING AND MENTORING

I teach across the undergraduate and graduate condensed-matter curriculum. My principal undergraduate course is PHYS 420 (Thermal Physics), a required core course I have taught six times to classes of ~30-40 students; at the graduate level I teach PHYS 513 (Quantum Theory of Solids II), the department's advanced condensed-matter-theory elective, and in 2025 I taught PHYS 518 (Critical Phenomena and Field Theory), a new graduate elective. In the classroom I emphasize building physical intuition alongside formal technique, and I work to make the environment welcoming and inclusive.

Mentoring is central to my program. I have built an independent research group that meets weekly and runs a research journal club, and I bring students into frontier problems early: of my Penn State publications, 16 are coauthored with my own students and postdoctoral fellows. My trainees have strong outcomes — a former postdoctoral fellow is now a faculty member at Westlake University, and a doctoral student was selected for both the Boulder School for Condensed Matter and Materials Physics and a KITP Graduate Fellowship — and my students present regularly at the APS March Meeting.

Courses

- **PHYS 420 (Thermal Physics)** — required undergraduate core; thermodynamics and statistical mechanics for all physics majors.
- **PHYS 513 (Quantum Theory of Solids II)** — the department's advanced graduate elective in many-body theory: second quantization, mean-field theory, Green's function techniques, diagrammatic calculation, transport theory, and superconductivity.
- **PHYS 518 (Critical Phenomena and Field Theory)** — a graduate elective applying renormalization-group and field-theoretic methods to critical phenomena in many-body physics.

Courses Taught at Penn State

Rating is the median of the end-of-course “meaningful learning experience” item (7-point SRTE through Spring 2023; 5-point SEEQ from Fall 2023).

Semester	Course	Title	Enroll.	Rating
Spring 2026	PHYS 513	Quantum Theory of Solids II (graduate)	8	5 / 5
Fall 2025	PHYS 420	Thermal Physics (undergraduate core)	32	4 / 5
Spring 2025	PHYS 518	Critical Phenomena and Field Theory (graduate elective)	14	4.5 / 5
Fall 2024	PHYS 420	Thermal Physics (undergraduate core)	26	5 / 5
Spring 2024	PHYS 420	Thermal Physics (undergraduate core)	48	4 / 5
Fall 2023	PHYS 420	Thermal Physics (undergraduate core)	41	4 / 5
Spring 2023	PHYS 513	Quantum Theory of Solids II (graduate)	9	6 / 7
Spring 2022	PHYS 513	Quantum Theory of Solids II (graduate)	13	7 / 7
Fall 2021	PHYS 420	Thermal Physics (undergraduate core)	30	6 / 7
Spring 2021	PHYS 420	Thermal Physics (undergraduate core)	46	6 / 7

Graduate Students and Postdoctoral Fellows

Ph.D. Students

- **Amogh Anakru** — Ph.D. candidate since 2021 (expected 2027). Dipolar symmetry, non-Fermi liquids, and composite-fermion metals. *Selected for the Boulder School for Condensed Matter and Materials Physics (2025); KITP Graduate Fellow (Fall 2026).*

- **Sarvesh Srinivasan** — Ph.D. candidate since 2021 (expected 2027). Crystalline and modulated-symmetry topological phases. *Selected for the Princeton Summer School in Condensed Matter Physics*.
- **Adrian Fedorko** — Ph.D. student since 2023. Moiré Kagome superlattices in twisted transition-metal dichalcogenides.
- **Anubhav Anilkumar** — Ph.D. student since 2024. Fractional Chern insulators in moiré systems.
- **Jinfei Zhou** — Ph.D. student since 2025.

Postdoctoral Fellows

- **Jian-Hao Zhang** — May 2022–June 2024. Now Assistant Professor, Westlake University.
- **Linhao Li** — October 2025–present.
- **Jacopo Gliozzi** — incoming CTEQ postdoctoral fellow (from August 2026).

Undergraduate Researchers

- **Claire Schubert** — undergraduate researcher (2025–present); continuing to the Ph.D. program at the CUNY Graduate Center.
- **Paul John Balderston** — undergraduate researcher (2022), co-advised with Prof. Sarang Gopalakrishnan; now an MSc student in theoretical physics at the University of Amsterdam and a visiting academic at the NYU Center for Cosmology and Particle Physics.

SERVICE

Since arriving at Penn State, my most sustained departmental service has been to the CAMP (Condensed Matter, Atomic, and Molecular Physics) Seminar, a cornerstone of the department's intellectual life. As its chair for the past four years, I led its post-pandemic revitalization — rebuilding attendance and broadening the diversity of invited speakers — to restore the series as a vibrant hub of scholarly exchange. I also serve on numerous other departmental committees, including graduate admissions, the qualifying examination, climate and diversity, and many Ph.D. comprehensive and dissertation committees. Beyond the department, I help organize timely research workshops, referee actively across the Physical Review family and other journals, and review proposals for the National Science Foundation.

Departmental Service

- **CAMP Seminar Committee** — member since 2020; Chair since 2022. Led a post-pandemic revitalization: diversified the speaker pool and prioritized in-person talks, introduced student-speaker lunches and pre-seminar refreshments, and streamlined speaker nomination — measurably increasing participation and greatly improving the intellectual environment.
- **Graduate Admissions Committee** — member (2024–present); condensed matter theory sub-field lead, review roughly 100 Ph.D. applications each admissions cycle.
- **Qualifying Examination Committee** — member (2023–2024); set, administered, and graded the written Ph.D. qualifying examination for the graduate program.
- **Physics Climate and Diversity Committee** — member (2024–present); contribute to departmental climate and culture, including the department's SEA Change self-assessment report.
- **Ph.D. Comprehensive Examination Committees** — Chair for my own students (Anakru, Srinivasan, Fedorko); committee member for 15+ additional doctoral students (2021–present).
- **Ph.D. Dissertation Committees** — committee member for 5+ students (2021–present).

College, University, and Outreach Service

- **Rainbow Science Network, Eberly College of Science** — member since 2020, supporting LGBTQIA+ inclusion in science.
- **Quantum Echoes: Uncovering Diverse Narratives in Physics** — founder and lead of this oral-history initiative, the outreach component of my NSF CAREER award (with support from the Physics Department). The project documents the personal and scientific journeys of physicists from various backgrounds — interviewing CAMP seminar speakers — to amplify diverse voices, preserve career-path narratives, and foster a more inclusive community for early-career researchers.

Professional Service

Conference and Workshop Organization

1. APS Global Summit 2026 — Invited Session organizer and chair, "Beyond Equilibrium: New Frontiers in Mixed-State Phases and Monitored Quantum Dynamics," March 2026
2. Organizer: Workshop at Simons Center for Geometry and Physics, "Bridging Classic and Contemporary Perspectives on Open Quantum Systems," May 2026

Journal Refereeing

Regular referee for Nature Physics, Nature Communications, Physical Review Letters, Physical Review X, PRX Quantum, Physical Review B, Physical Review Research, Physical Review A, Journal of High Energy Physics, Chinese Physics Letters, and SciPost.

Grant Proposal Review

- National Science Foundation — ad-hoc reviewer for regular and CAREER proposals (2024–2026).
- Dutch Research Council (NWO) — ad-hoc reviewer, Veni Talent Programme (2021).