Aidan Patrick Reddy

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EDUCATION

Massachusetts Institute of Technology — Cambridge, MA
Ph.D. in Physics — 9/2021 - 9/2026 (expected)

Columbia College, Columbia University — New York, NY
B.A. in Physics with a Concentration in Mathematics, *magna cum laude* — 9/2018 - 4/2021

Swarthmore College — Swarthmore, PA
transferred — 9/2017 - 5/2018

HONORS & FELLOWSHIPS

Jane Street Graduate Research Fellowship Finalist — 5/2025
Kavli Institute for Theoretical Physics Graduate Fellowship — 7/2024-12/2024
Phi Beta Kappa — 4/2021
Columbia College Physics Department Honors — 4/2021
NSF GRFP Honorable Mention — 2021 & 2022
Columbia College Work Exemption Program Grant — fall 2019 & spring 2020
Dean's List — all semesters

RESEARCH EXPERIENCE

Graduate Research Assistant, MIT Department of Physics — Cambridge, MA
Advisor: Liang Fu — 4/2022 - Present
Project title: *Electron fractionalization in moiré superlattices*

Research Experience for Undergraduates, Columbia University MRSEC — New York, NY
Advisor: Allan H. MacDonald — 6/2020 - 9/2021
Project title: *Resonant Coulomb energy transfer in transition metal dichalcogenide moirés*

Undergraduate Research Assistant, Columbia Department of Physics — New York, NY
Advisor: Cory Dean — 1/2019 - 3/2020
Project title: *Achieving precise twist-angle control and homogeneity in twisted bilayer graphene devices*

Science Undergraduate Laboratory Internship, SLAC National Lab — Menlo Park, CA
Advisors: Ryan Davis, Apurva Mehta — 6/2019 - 8/2019
Project title: *Correction of self-absorption distortion in X-ray absorption near-edge spectroscopy*

TEACHING EXPERIENCE

Teaching Assistant, MIT Department of Physics — Cambridge, MA
Classical Mechanics — fall 2025
Quantum Physics II — spring 2025
Theory of Solids I — fall 2022 & fall 2023
Junior Lab II — spring 2022

Teaching Assistant, Swarthmore College Deparment of Mathematics — Swarthmore, PA
Single-Variable Calculus II — spring 2018

PUBLICATIONS

*co-first author

1. **A. P. Reddy**, D. N. Sheng, A. Abouelkomsan, E. J. Bergholtz, and L. Fu, "Anti-topological crystal and non-Abelian liquid in twisted semiconductor bilayers", Nature Communications, in press. (2026).
2. B. A. Foutty, **A. P. Reddy**, C. R. Kometter, K. Watanabe, T. Taniguchi, T. Devakul, and B. E. Feldman, "Magnetic Hofstadter cascade in a twisted semiconductor homobilayer", Nat. Phys., 1–7 (2025).
3. E. Anderson, J. Cai, **A. P. Reddy**, H. Park, W. Holtzmann, K. Davis, T. Taniguchi, K. Watanabe, T. Smolenski, A. Imamoğlu, T. Cao, D. Xiao, L. Fu, W. Yao, and X. Xu, "Trion sensing of a zero-field composite Fermi liquid", Nature 635, 590–595 (2024).
4. H. Li, Z. Xiang, **A. P. Reddy**, T. Devakul, R. Sailus, R. Banerjee, T. Taniguchi, K. Watanabe, S. Tongay, A. Zettl, L. Fu, M. F. Crommie, and F. Wang, "Wigner molecular crystals from multielectron moiré artificial atoms", Science 385, 86–91 (2024).
5. B. A. Foutty, C. R. Kometter, T. Devakul, **A. P. Reddy**, K. Watanabe, T. Taniguchi, L. Fu, and B. E. Feldman, "Mapping twist-tuned multiband topology in bilayer WSe_2", Science 384, 343–347 (2024).
6. T. Tan*, **A. P. Reddy***, L. Fu, and T. Devakul, "Designing topology and fractionalization in narrow gap semiconductor films via electrostatic engineering", Phys. Rev. Lett. 133, 206601 (2024).
7. **A. P. Reddy***, N. Paul*, A. Abouelkomsan, and L. Fu, "Non-Abelian fractionalization in topological minibands", Phys. Rev. Lett. 133, 166503 (2024).
   Featured in Physics
8. D. N. Sheng, **A. P. Reddy**, A. Abouelkomsan, E. J. Bergholtz, and L. Fu, "Quantum anomalous Hall crystal at fractional filling of moiré superlattices", Phys. Rev. Lett. 133, 066601 (2024).
   Editors' Suggestion

9. A. Abouelkomsan, **A. P. Reddy**, L. Fu, and E. J. Bergholtz, "Band mixing in the quantum anomalous Hall regime of twisted semiconductor bilayers", Phys. Rev. B 109, L121107 (2024).
10. Z. Lu, T. Han, Y. Yao, **A. P. Reddy**, J. Yang, J. Seo, K. Watanabe, T. Taniguchi, L. Fu, and L. Ju, "Fractional quantum anomalous Hall effect in multilayer graphene", Nature 626, 759–764 (2024).
11. **A. P. Reddy**, T. Devakul, and L. Fu, "Artificial atoms, Wigner molecules, and an emergent kagome lattice in semiconductor moiré superlattices", Phys. Rev. Lett. 131, 246501 (2023).
    Editors' Suggestion
12. **A. P. Reddy** and L. Fu, "Toward a global phase diagram of the fractional quantum anomalous Hall effect", Phys. Rev. B 108, 245159 (2023).
    Editors' Suggestion
13. H. Goldman*, **A. P. Reddy***, N. Paul*, and L. Fu, "Zero-field composite Fermi liquid in twisted semiconductor bilayers", Phys. Rev. Lett. 131, 136501 (2023).
    Featured in Physics, Editors' Suggestion
14. **A. P. Reddy**, F. Alsallom, Y. Zhang, T. Devakul, and L. Fu, "Fractional quantum anomalous Hall states in twisted bilayer $MoTe_2$ and WSe_2", Phys. Rev. B 108, 085117 (2023).
    Editors' Suggestion
15. C. R. Kometter, J. Yu, T. Devakul, **A. P. Reddy**, Y. Zhang, B. A. Foutty, K. Watanabe, T. Taniguchi, L. Fu, and B. E. Feldman, "Hofstadter states and re-entrant charge order in a semiconductor moiré lattice", Nat. Phys. 19, 1861–1867 (2023).

PREPRINTS

1. **A. P. Reddy** and L. Fu, "Quantum melting a Wigner crystal into Hall liquids", arXiv:2508.21000 (2025).
2. N. Paul*, A. Abouelkomsan*, **A. P. Reddy***, and L. Fu, "Shining light on collective modes in moiré fractional Chern insulators", arXiv:2502.17569 (2025).
3. D. Luo, **A. P. Reddy**, T. Devakul, and L. Fu, "Artificial intelligence for artificial materials: moiré atom", arXiv:2303.08162 (2023).

TALKS

1. Flatiron Institute Center for Computational Quantum Physics Seminar (invited) 10/2025
   Quantum melting a Wigner crystal into Hall liquids
2. Stanford Condensed Matter Physics Seminar (invited) 10/2025
   Quantum melting a Wigner crystal into Hall liquids
3. UCLA Quantum Seminar (invited) 3/2025
   Fractional quantum anomalous Hall effects in twisted $MoTe_2$ bilayers
4. American Physical Society Global Physics Summit 2025 (invited symposium) 3/2025
   Fractional quantum anomalous Hall effects in twisted $MoTe_2$ bilayers
5. Harvard Condensed Matter Theory Kids' Seminar (invited) 3/2025
   Shining light on collective modes in fractional quantum anomalous Hall states
6. Cornell University Condensed Matter Theory Seminar (invited) 1/2025
   Non-Abelian fractional Chern insulators and competing states in twisted $MoTe_2$ bilayers
7. Università di Pisa Condensed Matter Physics Seminar (invited) 11/2024
   Fractional quantum anomalous Hall effects in twisted semiconductor bilayers
8. Kavli Institute for Theoretical Physics Moiré Workshop Seminar (invited) 9/2024
   Non-Abelian fractional Chern insulator in twisted semiconductor bilayers
9. Kavli Institute for Theoretical Physics Condensed Matter Theory Seminar (invited) 8/2024
   Topology and fractionalization in moiré materials
10. Stanford GLAM Seminar (invited) 5/2024
    Quantum anomalous Hall regime in twisted semiconductor bilayers
11. American Physical Society March Meeting 4/2024
    Toward a global phase diagram of the fractional quantum anomalous Hall effect
12. Physical Review Journal Club (invited) 11/2023
    Zero-field composite Fermi liquid in twisted semiconductor bilayers
13. MIT Condensed Matter Theory Seminar (invited) 5/2023
    Fractional quantum anomalous Hall states in semiconductor moiré homobilayers
14. American Physical Society March Meeting 3/2022
    Moiré resonant energy transfer
15. Extraordinary Electronic Switching of Thermal Transport MURI Collaboration (invited) 8/2021
    Resonant Energy Transfer in TMD Moirés
16. Columbia Undergraduate Science Journal, Columbia University (invited) 11/2020
    X-Ray Absorption Spectroscopy "Self-Absorption" Correction
17. Cory Dean Lab Meeting, Columbia University 10/2020
    Journal Club on Mapping Local Heterogeneity in Open-Faced Twisted Bilayer Graphene Devices
18. Arun Majumdar Lab Meeting, Stanford University (invited) 8/2020

Energy transfer via Coulomb Scattering in twisted bilayer Transition Metal Dichalcogenides

19. Cory Dean Lab Meeting, Columbia University (invited) 8/2020
    Energy transfer via Coulomb Scattering in twisted bilayer Transition Metal Dichalcogenides
20. MRSEC REU Presentation, Columbia University 7/2020
    Energy transfer via Coulomb Scattering in twisted bilayer Transition Metal Dichalcogenides
21. Cory Dean Lab Meeting, Columbia University 4/2020
    Nematicity and Competing Orders in Superconducting Magic-Angle Graphene
22. Solid State Physics Course, Columbia University 12/2019
    A Stack, a Twist, and a Hint of "Magic": Correlated Physics in twisted bilayer Graphene
23. Society of Physics Students, Columbia University 10/2019
    A Stack, a Twist, and a Hint of "Magic": Correlated Physics in twisted bilayer Graphene
24. SULI Program Final Presentation, SLAC National Accelerator Laboratory 8/2019
    X-Ray Absorption Spectroscopy "Self-Absorption" Correction
25. Cory Dean Lab Meeting, Columbia University 4/2019
    Optimizing the Homogeneity of Twisted Bilayer Graphene Devices

POSTERS

1. Northeast Quantum Forum 2025: AI in Quantum 10/2025
   Quantum melting a Wigner crystal into Hall liquids
2. University of Colorado at Boulder Summer School for Condensed Matter Physics 7/2025
   Wigner crystals and integer quantum Hall states in the two-dimensional electron gas
3. Thouless Institute Winter Workshop, University of Washington 1/2024
   Toward a global phase diagram of the fractional quantum anomalous Hall effect
4. Quantum Geometry in Condensed Matter Workshop (Beverly, MA) 10/2023
   Fractional quantum anomalous Hall regime in twisted semiconductor bilayers
5. Dynamical Response and Transport in Quantum Magnets workshop, KITP 8/2023
   Fractional quantum anomalous Hall regime in twisted semiconductor bilayers
6. Quantum materials group meeting, Canadian Institute for Advanced Research 5/2023
   Fractional quantum anomalous Hall states in semiconductor moiré homobilayers
7. Topology, symmetry, and interactions in crystals workshop, KITP 4/2023
   Moiré atoms, Wigner molecules, and emergent Kagome lattice
8. Frontiers of Quantum Materials and Devices Conference (Valencia, Spain) 6/2022
   Electron-assisted hopping in semiconductor moirés

MEDIA COVERAGE

1. Thomson, E. A. (2024, November 18). *MIT physicists predict exotic form of matter with potential for quantum computing*. MIT News.
2. Wilkinson, R. (2024, October 17). *Quantum Computing with a Twist*. Physics Magazine.
3. Chu, J. (2024, February 21). *Electrons become fractions of themselves in graphene, study finds*. MIT News.
4. Fadelli, I. (2024, September 2). *Exploring new physics arising from electron interactions in semiconductor moiré structures*. Phys.org.
5. Fadelli, I. (2024, September 1). *Study predicts a new quantum anomalous crystal in fractionally filled moiré superlattices*. Phys.org.
6. Duque, T. (2024, November 7). *Wigner molecular crystals from multielectron moiré artificial atoms*. Berkeley Lab News Center.
7. Hadhazy, A. (2024, May 8). *A "magic" angle between layers in a stacked nanoscale system offers intriguing material properties*. Stanford School of Humanities and Sciences News.
8. Jain, J. (2023, September 27). *In a twist, composite fermions form and flow without a magnetic field*. APS Physics Magazine.
9. Feldman, B.E. (2023, September 18). *Competing electron solids and electron fluids in the moiré atomic limit*. Nature Physics.