Aidan Patrick Reddy

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EDUCATION

Massachusetts Institute of Technology — *Cambridge, MA*
Ph.D. Candidate in Physics — 9/2021-Present
Thesis advisor: Liang Fu

Columbia University — *New York, NY*
B.A. in Physics with a Concentration in Mathematics, *magna cum laude* — 9/2018-04/2021

HONORS & FELLOWSHIPS

Jane Street Graduate Research Fellowship Finalist	2025
Kavli Institute for Theoretical Physics Graduate Fellowship	7/2024-12/2024
Phi Beta Kappa	4/2021
Columbia University 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: *Quantum many-body physics in moiré superlattices*

Research Experience for Undergraduates, Columbia University MRSEC — *New York, NY*
Advisor: Allan MacDonald (UT Austin) — 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*

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

P1. Anderson, E., Cai, J., **Reddy, A. P.**, Park, H., Holtzmann, W., Davis, K., Taniguchi, T., Watanabe, Smolenski, T., Imamoğlu, A., Cao, T., Xiao, Di., Fu, L., Yao, W., & Xu, X. (2024). *Trion sensing of a zero-field composite Fermi liquid. Nature, 635*(8039), 590–595.

P2. Li, H., Xiang, Z., **Reddy, A. P.**, Devakul, T., Sailus, R., Banerjee, R., Taniguchi, T., Watanabe, K., Tongay, S., Zettl, A., Fu, L., Crommie, M.F., & Wang, F. (2024). *Wigner molecular crystals from multielectron moiré artificial atoms. Science, 385*(6704), 86–91.

P3. Foutty, B. A., Kometter, C. R., Devakul, T., **Reddy, A. P.**, Watanabe, K., Taniguchi, T., Fu, L., & Feldman, B. E. (2024). *Mapping twist-tuned multiband topology in bilayer WSe_2. Science, 384*(6693), 343–347.

P4. Tan, T.*, **Reddy, A. P.***, Fu, L., & Devakul, T. (2024). *Designing topology and fractionalization in narrow gap semiconductor films via electrostatic engineering. Physical Review Letters, 133*(20), 206601.

P5. **Reddy, A. P.***, Paul, N.*, Abouelkomsan, A., & Fu, L. (2024). *Non-Abelian fractionalization in topological minibands. Physical Review Letters, 133*(16), 166503.
Featured in Physics

P6. Sheng, D. N., **Reddy, A. P.**, Abouelkomsan, A., Bergholtz, E. J., & Fu, L. (2024). *Quantum anomalous Hall crystal at fractional filling of moiré superlattices. Physical Review Letters, 133*(6), 066601.
Editors' suggestion

P7. Abouelkomsan, A., **Reddy, A. P.**, Fu, L., & Bergholtz, E. J. (2024). *Band mixing in the quantum anomalous Hall regime of twisted semiconductor bilayers. Physical Review B, 109*(12), L121107.

P8. Lu, Z., Han, T., Yao, Y., **Reddy, A. P.**, Yang, J., Seo, J., Watanabe, K., Taniguchi, T., Fu, L., & Ju, L. (2024). *Fractional quantum anomalous Hall effect in multilayer graphene. Nature, 626*(8000), 759–764.

P9. **Reddy, A. P.**, Devakul, T., & Fu, L. (2023). *Artificial atoms, Wigner molecules, and an emergent kagome lattice in semiconductor moiré superlattices. Physical Review Letters, 131*(24), 246501.
Editors' suggestion

P10. **Reddy, A. P.**, & Fu, L. (2023). *Toward a global phase diagram of the fractional quantum anomalous Hall effect. Physical Review B, 108*(24), 245159.
Editors' suggestion

P11. Goldman, H.*, **Reddy, A. P.***, Paul, N.*, & Fu, L. (2023). *Zero-field composite Fermi liquid in twisted semiconductor bilayers. Physical Review Letters, 131*(13), 136501.
Featured in Physics, Editors' suggestion

P12. **Reddy, A. P.**, Alsallom, F., Zhang, Y., Devakul, T., & Fu, L. (2023). *Fractional quantum anomalous Hall states in twisted bilayer $MoTe_2$ and WSe_2. Physical Review B, 108*(8), 085117.
Editors' suggestion

P13. Kometter, C. R., Yu, J., Devakul, T., **Reddy, A. P.**, Zhang, Y., Foutty, B. A., Watanabe, K., Taniguchi, T., Fu, L., & Feldman, B. E. (2023). *Hofstadter states and re-entrant charge order in a semiconductor moiré lattice. Nature Physics, 19*(12), 1861–1867.

PREPRINTS

PR1. **Reddy, A. P.**, & Fu, L. (2025). *Quantum melting a Wigner crystal into Hall liquids.* arXiv:2508.21000.

PR2. Paul, N.*, Abouelkomsan, A.*, **Reddy, A. P.***, & Fu, L. (2025). *Shining light on collective modes in moiré fractional Chern insulators.* arXiv:2502.17569.

PR3. Foutty, B. A., **Reddy, A. P.**, Kometter, C. R., Watanabe, K., Taniguchi, T., Devakul, T., & Feldman, B. E. (2024). *Magnetic Hofstadter cascade in a twisted semiconductor homobilayer.* arXiv:2412.20334.

PR4. **Reddy, A. P.**, Sheng, D. N., Abouelkomsan, A., Bergholtz, E. J., & Fu, L. (2024). *Anti-topological crystal and non-Abelian liquid in twisted semiconductor bilayers.* arXiv:2411.19898.

PR5. Luo, D., **Reddy, A. P.**, Devakul, T., & Fu, L. (2023). *Artificial intelligence for artificial materials: moiré atom.* arXiv:2303.08162.

TALKS

T1. UCLA Quantum Seminar (invited) 3/2025
Fractional quantum anomalous Hall effects in twisted $MoTe_2$ bilayers

T2. American Physical Society Global Physics Summit 2025 (invited symposium) 3/2025
Fractional quantum anomalous Hall effects in twisted $MoTe_2$ bilayers

T3. Harvard Condensed Matter Theory Kids' Seminar (invited) 3/2025
Shining light on collective modes in fractional quantum anomalous Hall states

T4. Cornell University Condensed Matter Theory Seminar (invited) 1/2025
Non-Abelian fractional Chern insulators and competing states in twisted $MoTe_2$ bilayers

T5. Università di Pisa Condensed Matter Physics Seminar (invited) 11/2024
Fractional quantum anomalous Hall effects in twisted semiconductor bilayers

T6. Kavli Institute for Theoretical Physics Moiré Workshop Seminar (invited) 9/2024
Non-Abelian fractional Chern insulator in twisted semiconductor bilayers

T7. Kavli Institute for Theoretical Physics Condensed Matter Theory Seminar (invited) 8/2024
Topology and fractionalization in moiré materials

T8. Stanford GLAM Seminar (invited) 5/2024
Quantum anomalous Hall regime in twisted semiconductor bilayers

T9. American Physical Society March Meeting 4/2024
Toward a global phase diagram of the fractional quantum anomalous Hall effect

T10. Physical Review Journal Club (invited) 11/2023
Zero-field composite Fermi liquid in twisted semiconductor bilayers

T11. MIT Condensed Matter Theory Seminar (invited) 5/2023
Fractional quantum anomalous Hall states in semiconductor moiré homobilayers

T12. American Physical Society March Meeting 3/2022
Moiré resonant energy transfer

T13. Extraordinary Electronic Switching of Thermal Transport MURI Collaboration (invited) 8/2021
Resonant Energy Transfer in TMD Moirés

T14. Columbia Undergraduate Science Journal, Columbia University (invited) 11/2020
X-Ray Absorption Spectroscopy "Self-Absorption" Correction

T15. Cory Dean Lab Meeting, Columbia University 10/2020
Journal Club on Mapping Local Heterogeneity in Open-Faced Twisted Bilayer Graphene Devices

T16. Arun Majumdar Lab Meeting, Stanford University (invited) 8/2020
Energy transfer via Coulomb Scattering in twisted bilayer Transition Metal Dichalcogenides

T17. Cory Dean Lab Meeting, Columbia University (invited) 8/2020
Energy transfer via Coulomb Scattering in twisted bilayer Transition Metal Dichalcogenides

T18. MRSEC REU Presentation, Columbia University 7/2020
Energy transfer via Coulomb Scattering in twisted bilayer Transition Metal Dichalcogenides

T19. Cory Dean Lab Meeting, Columbia University 4/2020

Nematicity and Competing Orders in Superconducting Magic-Angle Graphene

T20. Solid State Physics Course, Columbia University 12/2019
A Stack, a Twist, and a Hint of "Magic": Correlated Physics in twisted bilayer Graphene

T21. Society of Physics Students, Columbia University 10/2019
A Stack, a Twist, and a Hint of "Magic": Correlated Physics in twisted bilayer Graphene

T22. SULI Program Final Presentation, SLAC National Accelerator Laboratory 8/2019
X-Ray Absorption Spectroscopy "Self-Absorption" Correction

T23. Cory Dean Lab Meeting, Columbia University 4/2019
Optimizing the Homogeneity of Twisted Bilayer Graphene Devices

POSTERS

PO1. 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

PO2. Thouless Institute Winter Workshop, University of Washington 1/2024
Toward a global phase diagram of the fractional quantum anomalous Hall effect

PO3. Quantum Geometry in Condensed Matter Workshop (Beverly, MA) 10/2023
Fractional quantum anomalous Hall regime in twisted semiconductor bilayers

PO4. Dynamical Response and Transport in Quantum Magnets workshop, KITP 8/2023
Fractional quantum anomalous Hall regime in twisted semiconductor bilayers

PO5. Quantum materials group meeting, Canadian Institute for Advanced Research 5/2023
Fractional quantum anomalous Hall states in semiconductor moiré homobilayers

PO6. Topology, symmetry, and interactions in crystals workshop, KITP 4/2023
Moiré atoms, Wigner molecules, and emergent Kagome lattice

PO7. Frontiers of Quantum Materials and Devices Conference (Valencia, Spain) 6/2022
Electron-assisted hopping in semiconductor moirés

MEDIA COVERAGE

M1. Thomson, E. A. (2024, November 18). *MIT physicists predict exotic form of matter with potential for quantum computing.* MIT News.

M2. Wilkinson, R. (2024, October 17). *Quantum Computing with a Twist.* Physics Magazine.

M3. Chu, J. (2024, February 21). *Electrons become fractions of themselves in graphene, study finds.* MIT News.

M4. Fadelli, I. (2024, September 2). *Exploring new physics arising from electron interactions in semiconductor moiré structures.* Phys.org.

M5. Fadelli, I. (2024, September 1). *Study predicts a new quantum anomalous crystal in fractionally filled moiré superlattices.* Phys.org.

M6. Duque, T. (2024, November 7). *Wigner molecular crystals from multielectron moiré artificial atoms.* Berkeley Lab News Center.

M7. 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.

M8. Jain, J. (2023, September 27). *In a twist, composite fermions form and flow without a magnetic field.* APS Physics Magazine.

M9. Feldman, B.E. (2023, September 18). *Competing electron solids and electron fluids in the moiré atomic limit.* Nature Physics.