

# Aidan Patrick Reddy

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## EDUCATION

<b>Massachusetts Institute of Technology</b>	Cambridge, MA
Ph.D. in Physics	9/2021-Present
<b>Columbia College, Columbia University</b>	New York, NY
B.A. in Physics with a Concentration in Mathematics, <i>magna cum laude</i>	9/2018-04/2021
<b>Swarthmore College</b>	Swarthmore, PA
transferred	9/2017-05/2018

## 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

<b>Graduate Research Assistant, MIT Department of Physics</b>	Cambridge, MA
Advisor: Liang Fu	4/2022 - Present
Project title: <i>Electron fractionalization in moiré superlattices</i>	
<b>Research Experience for Undergraduates, Columbia University MRSEC</b>	New York, NY
Advisor: Allan H. MacDonald	6/2020 - 9/2021
Project title: <i>Resonant Coulomb energy transfer in transition metal dichalcogenide moirés</i>	
<b>Undergraduate Research Assistant, Columbia Department of Physics</b>	New York, NY
Advisor: Cory Dean	1/2019 - 3/2020
Project title: <i>Achieving precise twist-angle control and homogeneity in twisted bilayer graphene devices</i>	
<b>Science Undergraduate Laboratory Internship, SLAC National Lab</b>	Menlo Park, CA
Advisors: Ryan Davis, Apurva Mehta	6/2019 - 8/2019
Project title: <i>Correction of self-absorption distortion in X-ray absorption near-edge spectroscopy</i>	

## TEACHING EXPERIENCE

<b>Teaching Assistant, MIT Department of Physics</b>	Cambridge, MA
Classical Mechanics	fall 2025
Quantum Physics II	spring 2025
Theory of Solids I	fall 2022 & fall 2023
Junior Lab II	spring 2022
<b>Teaching Assistant, Swarthmore College Department of Mathematics</b>	Swarthmore, PA
Single-Variable Calculus II	spring 2018

## PUBLICATIONS

- \*co-first author
1. 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).
  2. 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).
  3. 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).
  4. 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<sub>2</sub>”, Science 384, 343–347 (2024).
  5. 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).
  6. **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

7. 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).
8. 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).

9. 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).
10. **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**

11. **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**

12. 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**

13. **A. P. Reddy**, F. Alsallom, Y. Zhang, T. Devakul, and L. Fu, “Fractional quantum anomalous Hall states in twisted bilayer MoTe<sub>2</sub> and WSe<sub>2</sub>”, *Phys. Rev. B* 108, 085117 (2023).

**Editors’ Suggestion**

14. 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

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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. **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”, arXiv:2411.19898 (2024).
4. D. Luo, **A. P. Reddy**, T. Devakul, and L. Fu, “Artificial intelligence for artificial materials: moiré atom”, arXiv:2303.08162 (2023).

## TALKS

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

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

## POSTERS

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

## MEDIA COVERAGE

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