

JUNKAI DONG

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EDUCATION

Harvard University

August 2021 - Present

Doctor of Philosophy

Major: Physics

Advisor: Ashvin Vishwanath

Cornell University

August 2017 - May 2021

Bachelor of Arts, Summa cum Laude.

Majors: Physics, Math

GPA: 4.174/4.3

Senior Thesis: *Averaging over deformed WZW models*

MANUSCRIPTS

First or Co-First Author

1. T. Soejima*, J. Dong*, T. Wang, T. Wang, M. P. Zaletel, A. Vishwanath, and D. E. Parker, “Anomalous Hall Crystals in Rhombohedral Multilayer Graphene II: General Mechanism and a Minimal Model”, *arXiv:2403.05522*.
2. J. Dong*, T. Wang*, T. Wang*, T. Soejima, M. P. Zaletel, A. Vishwanath, and D. E. Parker, “Anomalous Hall Crystals in Rhombohedral Multilayer Graphene I: Interaction-Driven Chern Bands and Fractional Quantum Hall States at Zero Magnetic Field”, *arXiv:2311.05568*. (Featured in Journal Club for Condensed Matter Physics.)
3. J. Dong, J. Wang, P. J. Ledwith, A. Vishwanath, and D. E. Parker, “Composite Fermi Liquid at Zero Magnetic Field in Twisted MoTe₂”, *Phys. Rev. Lett.* **131**, 136502 (2023). *arXiv:2306.01719*. (Editor’s Suggestion, Featured in *Physics*)
4. J. Dong, P. J. Ledwith, E. Khalaf, J. Y. Lee, and A. Vishwanath, “Many-Body Ground States from Decomposition of Ideal Higher Chern Bands: Applications to Chirally Twisted Graphene Multilayers”, *Phys. Rev. Research* **5**, 023166 (2023). *arXiv:2210.13477*.
5. J. Dong, J. Wang, and L. Fu, “Dirac electron under periodic magnetic field: Platform for fractional Chern insulator and generalized Wigner crystal”, *arXiv:2208.10516*.
6. J. Dong, T. Hartman, and Y. Jiang, “Averaging over moduli in deformed WZW models”, *J. High Energ. Phys.* **2021**, 185 (2021). *arXiv:2105.12594*.
7. J. Dong, V. Juricic, and B. Roy, “Topoelectric circuits: Theory and construction”, *Phys. Rev. Research* **3**, 023056 (2021). *arXiv:2008.11202*.
8. J. Dong and E. Mueller, “Exact Topological Flat Bands from Continuum Landau Levels”, *Phys. Rev. A* **101**, 013629 (2020). *arXiv:1910.08429*.
9. J. Dong, Y. Chen, D. Xu, and Z.-Q. Yin, “Greenberger-Horne-Zeilinger test for multi-dimension and arbitrary time nodes entangled histories”, *Sci. Bull.* **62**(18), pp.1235-1238 (2016). *arXiv:1610.04296*.

Others

3. M. Fujimoto, D. E. Parker, J. Dong, E. Khalaf, A. Vishwanath, and P. J. Ledwith, “Higher vortexability: zero field realization of higher Landau levels”, *arXiv:2403.00856*.

2. Q. Gao, J. Dong, P. J. Ledwith, D. E. Parker, and E. Khalaf, “Untwisting moiré physics: Almost ideal bands and fractional Chern insulators in periodically strained monolayer graphene”, *Phys. Rev. Lett.* **131**, 096401 (2023). *arXiv:2211.00658*. (PRL cover)
1. J. Dong, V. Elser, G. Gyawali, K. Y. Jee, J. Kent-Dobias, A. Mandaiya, M. Renz, and Y. Su, “Glass phenomenology in the hard matrix model”, *J. Stat. Phys.* **2021**(9), 093302 (2021). *arXiv:1912.07558*.

PRESENTATIONS

Invited Talks

- *Anomalous Hall Crystal in Rhombohedral Multilayer Graphene*, Invited Talk, Quantum Theory Seminar, Cornell University, April 2024.
- *Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$* , Talk, APS March Meeting, 2024.
- *Composite Fermions Form and Flow without a Magnetic Field*, Invited Talk, Physical Review Journal Club, American Physical Society, November 2023.
- *Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$* , Invited Talk, Special AEP Seminar, Cornell University, August 2023.
- *Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$* , Invited Talk, Thouless Institute for Quantum Matter Seminar, University of Washington Seattle, June 2023.
- *Exact Many-Body Ground States from Decomposition of Ideal Higher Chern Bands: Applications to Chirally Twisted Graphene Multilayers*, Talk, APS March Meeting, 2023.
- *Exact Many-Body Ground States from Decomposition of Ideal Higher Chern Bands: Applications to Chirally Twisted Graphene Multilayers*, Invited Talk, Quantum Matter in Mathematics and Physics, Center of Mathematical Sciences and Applications, Harvard University, MA, Dec 2022.

Posters

- *Anomalous Hall Crystals in Rhombohedral Multilayer Graphene*, Poster, Thouless Institute for Quantum Matter Winter Workshop, WA, Jan 2024.
- *Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$* , Poster, Thouless Institute for Quantum Matter Winter Workshop, WA, Jan 2024.
- *Anomalous Hall Crystals in Rhombohedral Multilayer Graphene*, Poster, National High Magnetic Field Laboratory Theory Winter School, FL, Jan 2024.
- *Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$* , Poster, National High Magnetic Field Laboratory Theory Winter School, FL, Jan 2024.
- *Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$* , Poster, Princeton Summer School on Condensed Matter Physics 2023, Princeton University, July 2023.
- *Exact Many-Body Ground States from Decomposition of Ideal Higher Chern Bands: Applications to Chirally Twisted Graphene Multilayers*, Poster, Spring 2023 meeting of the Simons Collaboration on Ultra-Quantum Matter, CU Boulder, CO, May 2023.
- *Exact Many-Body Ground States from Decomposition of Ideal Higher Chern Bands: Applications to Chirally Twisted Graphene Multilayers*, Poster, National High Magnetic Field Laboratory Theory Winter School, FL, Jan 2023.
- *Exact Topological Flat Bands from Continuum Landau Levels*, Poster, ARO/AFOSR MURI Program Review Meeting, UMass Amherst, MA, Oct 2019.

Journal Clubs

- *Thermodynamic Quantities from Capacitive Measurements for 2D Materials*, Journal Club, Condensed Matter Experiments for Theorists, Oct 2023.

HONORS AND AWARDS

- KITP Graduate Fellow, Kavli Institute for Theoretical Physics, University of California Santa Barbara, 2024
- Gertrude and Maurice Goldhaber Prize, Harvard University, 2024 (4/250)
- Purcell Fellowship, Harvard University, 2021
- Shou-Cheng Zhang Fellowship, Stanford University, 2021 (Declined)
- First-year Fellowship, Massachusetts Institute of Technology, 2021 (Declined)
- Donald R. Yennie Prize in Physics, Cornell University, 2021
- Bethe Thesis Prize in Physics, Cornell University, 2021

TEACHING EXPERIENCE

Teaching Fellow, Fall 2023

Held sections and office hours for PHYSICS 195A (Solid State Physics).

Teaching Assistant, Fall 2019

Held one-hour study halls for PHYS 7651 (Quantum Field Theory 1) every week.

Teaching Assistant, Fall 2020

Graded homework and answers questions online for PHYS 7681 (Quantum Information Processing).

SERVICE

Cornell Alumni Admissions Ambassadors Network Volunteer, Spring 2024

Met with prospective applicants to discuss details about undergraduate experience at Cornell.

Journal Referee, 2023-2024

Provided peer review for:

- Physical Review X ($\times 1$)
- Physical Review Letters ($\times 1$)
- Physical Review Research ($\times 3$)
- Physical Review B ($\times 13$)
- Journal of Physics: Condensed Matter ($\times 2$)

SKILLS

Languages Chinese (native), English (fluent)

Software Julia, bash, slurm, MATHEMATICA, Powerpoint, L^AT_EX