JUNKAI DONG

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EDUCATION

Doctor of Philosophy in Physics Expected May 2027
Harvard University, Cambridge, MA
Advisor: Ashvin Vishwanath

Master of Arts in Physics May 2024
Harvard University, Cambridge, MA

Bachelor of Arts in Physics and Mathematics, *summa cum laude* May 2021
Cornell University, Ithaca, NY
Thesis: *Averaging over deformed WZW models*

MANUSCRIPTS

First or Co-First Author

9. 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", *Phys. Rev. B* **110**, 205124 (2024). *arXiv:2403.05522*.

8. 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", *Phys. Rev. Lett.* **133**, 206503 (2024). *arXiv:2311.05568*. (Featured in Journal Club for Condensed Matter Physics.)

7. J. Dong, J. Wang, P. J. Ledwith, A. Vishwanath, and D. E. Parker, "Composite Fermi Liquid at Zero Magnetic Field in Twisted $MoTe_2$", *Phys. Rev. Lett.* **131**, 136502 (2023). *arXiv:2306.01719*. (Editor's Suggestion, Featured in *Physics*)

6. 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*.

4. J. Dong, T. Hartman, and Y. Jiang, "Averaging over moduli in deformed WZW models", *J. High Energ. Phys.* **2021**, 185 (2021). *arXiv:2105.12594*.

3. J. Dong, V. Juricic, and B. Roy, "Topolectric circuits: Theory and construction", *Phys. Rev. Research* **3**, 023056 (2021). *arXiv:2008.11202*.

2. J. Dong and E. Mueller, "Exact Topological Flat Bands from Continuum Landau Levels", *Phys. Rev. A* **101**, 013629 (2020). *arXiv:1910.08429*.

1. 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

5. P. J. Ledwith, J. Dong, A. Vishwanath, and E. Khalaf, "Nonlocal Moments in the Chern Bands of Twisted Bilayer Graphene", *arXiv:2408.16761*.

4. Q. Li, J. Dong, P. J. Ledwith, and E. Khalaf, "Constraints on real space representations of Chern bands", *arXiv:2407.02561*.

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

- *Stripping off the Magnetic Field from the Lowest Landau Level*, Invited Talk, KITP Locals Lunch, August 2024.
- *Anomalous Hall Crystal in Rhombohedral Multilayer Graphene*, Invited Talk, KITP Condensed Matter Meeting, July 2024.
- *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, led office hours, and graded homework and exams 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

APS March Meeting Session Chair, 2024
Chaired session Z07: Magnetic Topological Semimetals III.
Journal Referee, 2023-2024
Provided peer review for:

- Physical Review X ($\times$4)
- Physical Review Letters ($\times$1)
- Physical Review Research ($\times$3)
- Physical Review B ($\times$17)
- Journal of Physics: Condensed Matter ($\times$3)

Cornell Alumni Admissions Ambassadors Network Volunteer, 2024
Met with prospective applicants to discuss details about undergraduate experience at Cornell.
Harvard Organ Society Recital Coordinator, 2022-2024
Revived the Busch Midday Recital Series after the COVID pandemic. Invited and hosted professional organists. Doubled audience size during tenure.

SKILLS

Languages Chinese (native), English (fluent)
Programming Languages Julia, Python, C++
Software bash, slurm, OpenMP, MPI, MATHEMATICA, LaTeX