Ruiheng Su

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Education

2024 – Present **Princeton University, NJ, USA**
Ph.D. Student, Quantum Science and Engineering

2018 – 2024 **University of British Columbia, Vancouver, BC, Canada**
Bachelor of Applied Science, Engineering Physics

Publications

1. **Su, R.,** Waters, D., *et al.* **Generalized anomalous Hall crystals in twisted bilayer-trilayer graphene.** *arXiv:2406.17766* (2024). (Under Review)
2. Waters, D., **Su, R.,** Thompson, E., *et al.* **Topological flat bands in a family of multilayer graphene moiré lattices.** *arXiv:2405.05913* (2024).
3. **Su, R.,** *et al.* **Superconductivity in twisted double bilayer graphene stabilized by WSe_2.** *Nat. Mater.* (2023). Featured in: *News & Views - Nature Materials*

Contributed Talks

2024 **"Current-bias spectroscopy of in-plane magnetoresistance on the microtesla scale in twisted monolayer-trilayer graphene."** *APS March Meeting, Minneapolis, MN, March 3-8th* (Speaker)

"Moiré-localized flat bands in a family of twisted Bernal-stacked graphene multilayers." *APS March Meeting, Minneapolis, MN, March 3-8th* (Co-author, in collaboration with Prof. M. Yankowitz, *University of Washington*)

"Integer quantum anomalous Hall state at fractional filling in twisted bilayer trilayer graphene." *Quantropy Meeting, Zürich, Switzerland, January 25th* (Speaker)

2023 **"Superconductivity in twisted double bilayer graphene stabilized by WSe_2."** *APS March Meeting, Las Vegas, NV, March 6-10th* (Speaker)

Poster Presentations

2024 **"Quantized Anomalous Hall Effect in Twisted Bilayer Trilayer Graphene."** *Thouless Institute for Quantum Matter Winter Workshop, University of Washington, Seattle, January 13-15th*

2023 **"Superconductivity and Isospin Order in Twisted Double Bilayer Graphene on WSe_2."** *Stewart Blusson Quantum Matter Institute (SBQMI) International Scientific Advisory Board Meeting, September 19-20th*

"Electronic Phases of Twisted Double Bilayer Graphene on WSe_2." *Canadian Institute for Advanced Research (CIFAR) Quantum Materials Program Spring School, Montreal, May 8-12th*

Awards and Honors

2023 **Edward G. Auld Prize in Engineering Physics**, *UBC*
Undergraduate Student Research Award, *Natural Sciences and Engineering Research Council of Canada (NSERC)*
First Place Poster Award, *International Scientific Advisory Board Meeting, SBQMI, UBC*

2022 **Trek Excellence Scholarship**, *UBC*

2018 **Academic Bronze Medal**, *The Governor General of Canada*
British Columbia Government Scholarship
Community Service Award, *Knights of Columbus Council*

Research Experience

2021 – 2024 **Correlation and Topology in Moiré Graphene** Prof. Joshua Folk, *UBC*

Transport measurements: I led several efforts in nanofabrication (electron beam lithography), measurement (Bluefors LD/XLD dilution refrigerators and ICEoxford VTI), data analysis, figure preparation, and manuscript writing. This resulted in a **1st-author publication** on superconductivity in twisted double bilayer graphene (T2+2) in Nature Materials (2023).

Collaborating with the group of Prof. Matthew Yankowitz, *University of Washington*, I discovered:

- Generalized versions of the anomalous Hall crystal in twisted bilayer-trilayer graphene (T2+3)
- Signatures of topological flat bands in the Bernal-stacked twisted multilayer graphene family

This resulted in **two manuscripts,** both currently under review (2024).

Thermodynamic measurements: I also led instrumentation efforts to probe 2D materials using aluminum single-electron transistors in both DC and phase-sensitive (AC) modes. I assembled the experimental setup to directly measure the inverse electronic compressibility by eliminating ground loops and optimizing passive circuits and feedback controllers to work with DC voltage sources and lock-in amplifiers.

2021 – 2022 **Charge noise in GaAs/AlGaAs Quantum Wells** Prof. Joshua Folk, *UBC*

Utilized the edge of a Coulomb blockade peak in a GaAs/AlGaAs quantum dot to measure the noise power spectral density. In the process, I optimized ohmic contacts and fabricated the quantum dots.

Skills

Nanoscale sample preparation

- Electron beam/photolithography
- Dry (RIE)/wet etching (HF)
- Electron beam evaporation
- Wire bonding
- Wafer dicing

2D materials

- Exfoliation/Dry transfer
- AFM lithography

Programming /Software

- Python, Igor Pro, C^{++}, Java, MATLAB, LaTeX, Processing, Assembly
- Adobe Illustrator, Microsoft Office

Electro/Mechanical

- Machine shop: Lathe, Milling
- Experience with CAD, PCB design, Soldering

Language

- English, Mandarin/Cantonese Chinese