

Anffany Chen, Ph.D.

Theoretical Physics Institute and Department of Physics

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Summary

Physicist with expertise in computational modeling, data science, and machine learning. Skilled at efficiently mastering new domains and devising strategies to tackle complex challenges, with a strong aptitude for collaboration, communication, and project management.

Employment

- **Postdoctoral Researcher** (2021/4 - 2024/8)
Theoretical Physics Institute and Department of Physics, University of Alberta
 - Characterized the properties of novel synthetic materials through theoretical research.
 - Designed and programmed computational models for various complex systems.
 - Applied machine learning to analyze large datasets and produce data-driven findings.
 - Authored successful grant proposals and publications in high-impact journals.
 - Managed multi-component projects within international teams.
- **Graduate Research Assistant** (2014/9 - 2019/7)
Stewart Blusson Quantum Matter Institute and Department of Physics and Astronomy, University of British Columbia
 - Conducted theoretical research on topological quantum materials.
 - Developed computational models to characterize anomalous material properties.
 - Authored publications in high-impact journals.
- **Teaching Assistant** (2014/9 - 2016/4)
Department of Physics and Astronomy, University of British Columbia
 - Assisted in teaching advanced quantum mechanics and statistical mechanics.
 - Facilitated introductory experimental physics labs.
- **Undergraduate Research Assistant** (2012/4 - 2013/4)
Department of Physics and Astronomy, University of British Columbia
 - Developed mathematical models to explore three-body problems in AMO physics.
- **Summer Intern** (2011/5 - 2011/8)
Department of Physics, Academia Sinica, Taiwan
 - Assisted in dark matter detection research by predicting experimental signals from theoretical models.
- **Undergraduate Research Assistant** (2010/4 - 2010/8)
Department of Physics and Astronomy, University of British Columbia
 - Developed computational models of nonlinear gravitational wave systems.
- **Summer Intern** (2009/7 - 2009/8)
TRIUMF
 - Monitored nuclear recoil experiments and assisted in construction of experimental apparatus.

Parental Leaves

- 2021/7 - 2021/10 (3 months)
- 2019/08 - 2021/3 (1 year 8 months)

Education

- 2014/9 - 2019/7 **Ph.D. Physics, Condensed Matter Theory**
University of British Columbia
Thesis: Realizing High-Energy Physics in Topological Semimetals
Supervisor: Marcel Franz
- 2013/8 - 2014/6 **M.Sc. Physics**
Perimeter Institute of Theoretical Physics and University of Waterloo
Thesis: Directional Dependence of Phase Transition Splitting by Uniaxial Strain: A New Test to Determine Sr_2RuO_4 Superconducting States
Supervisor: Xiao-Gang Wen
- 2009/9 - 2013/4 **B.Sc. Combined Honours in Physics and Mathematics**
University of British Columbia, Vancouver, BC
Thesis: Universal Three-Body Energy Spectrum in 2D Ultracold Bose-Fermi Mixtures Near Feshbach Resonance
Supervisor: Fei Zhou

Certifications

- **Reinforcement Learning Specialization**
University of Alberta and Alberta Machine Intelligence Institute
Issued 2024/8
- **STEM Teaching Certificate**
Center for the Integration of Research, Teaching, and Learning (CIRTL), University of British Columbia
Issued 2017/3

Skills

- **Technical Skills**
 - Data Analysis: Data Management and Manipulation, Data Visualization, Statistical Modeling (Regression Analysis, Error Analysis)
 - Machine Learning: Supervised Learning, Reinforcement Learning, Deep Learning
 - Programming: Python, MATLAB, Shell Scripting, HTML, Fortran, Mathematica
- **Research and Analytical Skills**
 - Literature Review
 - Mathematical or Computational Modeling of Complex Systems
 - Model Analysis and Interpretation
 - Algorithm Design and Optimization
 - Advanced Mathematics: Group Theory, Graph Theory, Linear Algebra, Statistics
- **Project Management**
 - Progress Monitoring and Reporting
 - Team Coordination
 - Funding Application
- **Communication Skills**
 - Scientific Publication
 - Technical Documentation
 - Public Speaking and Conference Presentation
 - Teaching and Mentorship

Publications

Peer-Reviewed Journal Articles

13. C. Sun, [A. Chen](#), T. Bzdušek, J. Maciejko
Topological linear response of hyperbolic Chern insulators
Preprint arXiv:2406.08388 (2024); submitted to SciPost
12. S. Dey*, [A. Chen](#)*, P. Basteiro, A. Fritzsche, M. Greiter, M. Kaminski, P. Lenggenhager, R. Meyer, R. Sorbello, A. Stegmaier, R. Thomale, J. Erdmenger, I. Boettcher
Simulating Holographic Conformal Field Theories on Hyperbolic Lattices
Phys. Rev. Lett. **133**, 061603 (2024), Editors' Suggestion
11. [A. Chen](#)
Many-body mobility edges in 1D and 2D revealed by convolutional neural networks
Phys. Rev. B **109**, 075124 (2024)
10. [A. Chen](#), J. Maciejko, I. Boettcher
Anderson localization transition in disordered hyperbolic lattices
Phys. Rev. Lett. **133**, 066101 (2024)
9. T. Tummuru*, [A. Chen](#)*, P. M. Lenggenhager*, T. Neupert, J. Maciejko, T. Bzdušek
Hyperbolic non-Abelian semimetal
Phys. Rev. Lett. **132**, 206601 (2024)
8. [A. Chen](#), Y. Guan, P. Lenggenhager, J. Maciejko, I. Boettcher, T. Bzdušek
Symmetry and topology of hyperbolic Haldane models
Phys. Rev. B **108**, 085114 (2023)
7. [A. Chen](#), H. Brand, T. Helbig, T. Hofmann, S. Imhof, A. Fritzsche, T. Kießling, A. Stegmaier, L. Upreti, T. Neupert, T. Bzdušek, M. Greiter, R. Thomale, I. Boettcher
Hyperbolic matter in electrical circuits with tunable complex phases
Nat. Commun. **14**, 622 (2023)
6. A. Lau, T. Hyart, C. Autieri, [A. Chen](#), D. I. Pikulin
Designing Three-Dimensional Flat Bands in Nodal-Line Semimetals
Phys. Rev. X **11**, 031017 (2021)
5. [A. Chen](#), R. Ilan, F. de Juan, D. I. Pikulin, M. Franz
Quantum Holography in a Graphene Flake with an Irregular Boundary
Phys. Rev. Lett. **121**, 036403 (2018), Editors' Suggestion
Highlighted in Physics World and Phys.org
Shortlisted for Breakthrough of the Year by Physics World
4. [A. Chen](#), D. I. Pikulin, M. Franz
Josephson current signatures of Majorana flat bands on the surface of time-reversal-invariant Weyl and Dirac semimetals
Phys. Rev. B **95**, 174505 (2017)
3. D. I. Pikulin, [A. Chen](#), M. Franz
Chiral Anomaly from Strain-Induced Gauge Fields in Dirac and Weyl Semimetals
Phys. Rev. X **6**, 041021 (2016)
2. [A. Chen](#), M. Franz
Superconducting proximity effect and Majorana flat bands at the surface of a Weyl semimetal
Phys. Rev. B **93**, 201105 (2016), Rapid Communication
1. P. J. C. Salter, M. Aliotta, T. Davinson, H. Al Falou, [A. Chen](#), B. Davids, B. R. Fulton, N. Galinski, D. Howell, G. Lotay, P. Machule, A. StJ. Murphy, C. Ruiz, S. Sjue, M. Taggart, P. Walden, P. J. Woods
Measurement of the $^{18}\text{Ne}(\alpha, p_0)^{21}\text{Na}$ Reaction Cross Section in the Burning Energy Region for X-Ray Bursts
Phys. Rev. Lett. **108**, 242701 (2012)

*Authors contributed equally.

Code and Data Sharing

- A. Chen, J. Maciejko, I. Boettcher, *Supplemental Data for: Anderson localization transition in disordered hyperbolic lattices*, Borealis, doi:10.5683/SP3/3LWXHR (2024)
- T. Tummuru, A. Chen, P. M. Lenggenhager, T. Neupert, J. Maciejko, T. Bzdušek, *Supplementary data and code for: Hyperbolic Non-Abelian Semimetal*, Zenodo, doi:10.5281/zenodo.10729119 (2024)
- A. Chen, Y. Guan, P. M. Lenggenhager, J. Maciejko, I. Boettcher, T. Bzdušek, *Supplementary Code and Data for "Symmetry and topology of hyperbolic Haldane models"*, Borealis, doi:10.5683/SP3/NUZRNR (2023)
- A. Chen, *Hyperbolic matter in electrical circuits with tunable complex phases*, Wolfram Community, url:community.wolfram.com/groups/-/m/t/2837328 (2023). [Staff Picks and Featured Contributor](#)
- A. Chen, H. Brand, T. Helbig, T. Hofmann, S. Imhof, A. Fritzsche, T. Kießling, A. Stegmaier, L. Upreti, T. Neupert, T. Bzdušek, M. Greiter, R. Thomale, I. Boettcher, *Supplementary Data for Hyperbolic Matter in Electrical Circuits with Tunable Complex Phases*, Borealis, doi:10.5683/SP3/EG9931 (2022)

Presentations

- (Invited) Keynote Talk: *Many-body mobility edges in 1D and 2D revealed by convolutional neural networks*, CAP congress, London, Canada, 2024/5
- Conference Talk: *Anderson localization transition in disordered hyperbolic lattices*, APS March Meeting, Minneapolis, USA, 2024/3
- (Invited) Symposium Talk: *Hyperbolic Haldane Models*, quanTA Symposium, University of Saskatchewan, Saskatoon, Canada, 2023/6
- Conference Talk: *Symmetry and topology of hyperbolic Haldane models*, Topological materials symposium, CAP Congress, Fredericton, Canada, 2023/6
- Conference Talk: *Hyperbolic Chern Insulators*, APS March Meeting, Virtual Meeting, USA, 2023/3
- (Invited) Colloquium: *Hyperbolic Topological Matter*, Department of Physics, University of Alberta, Edmonton, Canada, 2023/1
- Conference Talk: *Quantum Holography in a Graphene Flake with an Irregular Boundary*, Quantum Materials Canada, Virtual Meeting, Canada, 2021/5
- (Invited) Seminar Talk: *Majorana flat bands at the proximitized surface of a Weyl semimetal*, Department of Applied Physics, Nagoya University, Nagoya, Japan, 2017/6
- Poster Presentation: *Superconducting proximity effect and Majorana flat bands at the surface of a Weyl semimetal*, Boulder School for Condensed Matter and Materials Physics, Boulder, USA, 2016/8
- Poster Presentation: *Pauli Blocking Effect on 2D Trimers Near Feshbach Resonance*, Joint Meeting of APS and CAP Divisions of Atomic Molecular and Optical Physics, Quebec City, Canada, 2013/6
- Poster Presentation: *Nuclear recoil energy spectrum of finite-sized dark matter*, 14th Annual Meeting of the Northwest Section of the APS, Vancouver, Canada, 2012/10

Grants and Awards

- **Avadh Bhatia Postdoctoral Fellowship**
Department of Physics, University of Alberta, 2022/5 - 2024/4
Competitive research funding of 120,000 CAD for two years
- **Quantum Electronic Science & Technology Ph.D. Award**
Stewart Blusson Quantum Matter Institute, University of British Columbia, 2016/9 - 2019/7
Competitive research funding of 90,000 CAD for three years

- **Perimeter Scholars International Award**
Perimeter Institute for Theoretical Physics, 2013/8 - 2014/6
Competitive full scholarship covering tuition and living expenses for master's program
- **NSERC Canada Graduate Scholarship (CGS)**
Natural Sciences and Engineering Research Council of Canada, 2013/8 - 2014/6
Competitive research funding of 17,500 CAD for one year of master's program
- **NSERC Undergraduate Student Research Award (USRA)**
Natural Sciences and Engineering Research Council of Canada, 2012/5 - 2012/8
Competitive research funding of 4,500 CAD for a summer internship
- **James A. Moore Memorial Scholarship**
University of British Columbia, 2011/9 - 2013/4.
Scholarship of 30,000 CAD for two years, awarded to the university's top scholar in a Combined Honours program in Mathematics and a science discipline
- **NSERC-CMS Math in Moscow Scholarship**
Natural Sciences and Engineering Research Council of Canada and Canadian Mathematical Society, 2011/2 - 2011/5
Competitive award of 9,000 CAD for a Mathematics study-abroad program at the Independent University of Moscow
- **Young Engineers and Scientists Fellowship**
TRIUMF, 2009/7 - 2009/8
Competitive research funding of 3,000 CAD for a summer internship at TRIUMF

Teaching

- **Research Mentor**
Department of Physics, University of Alberta, 2023/9 - 2024/8
Provided research mentorship to undergraduate and graduate students in the PI's group
- **Substitute Lecturer**
Department of Physics and Astronomy, University of British Columbia, 2016/10 - 2017/10, occasional
Prepared and delivered lectures in third-year quantum mechanics
- **Teaching Assistant**
Department of Physics and Astronomy, University of British Columbia, 2014/9 - 2016/4
Taught five semester-long courses as teaching assistant in experimental physics, quantum mechanics, and statistical mechanics. Graded assignments and lab reports. Facilitated lab sessions.

Academic Services

- Referee for peer-reviewed journals, 2017 - present
 - Physical Review Materials
 - Physical Review B
 - Physical Review Letters
- Panelist at graduate student recruitment event, 2023/11
- Interview in The Gateway, University of Alberta's student newspaper, 2023/6
- Organizing committee of CIFAR Quantum Materials Summer School, 2017/4
- Interview in TRIUMF's newsletter, 2015/4
- Organizing committee of Physics Olympics at the University of British Columbia, 2010/3 - 2013/3

References

- Prof. Igor Boettcher, Postdoc Supervisor
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- Prof. Joseph Maciejko, Postdoc Supervisor
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- Prof. Marcel Franz, PhD Supervisor
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