

LOGAN BISHOP-VAN HORN

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EDUCATION

Stanford University

PhD Physics, June 2024. M.S. Physics, Jan. 2019. Advisor: Kathryn A. Moler

Dissertation: Local magnetic response and vortex dynamics in thin film superconductors

Clark University

B.A. Physics & Mathematics, *summa cum laude*, highest honors in Physics, December 2016

RESEARCH EXPERIENCE

Technical Staff

MIT Lincoln Laboratory, Group 89

August 2024 – present

Lexington, MA

- \diamond Technical Staff scientist working on superconducting devices. Logan.Bishop-VanHorn@ll.mit.edu

Graduate Student

Stanford University Department of Physics, Advisor: Kathryn A. Moler

Sept. 2017 – Jan. 2019, Jan. 2021 – June 2024

Stanford, CA

- \diamond Developed open-source software for simulating the magnetic response of 2D superconducting devices with arbitrary geometry using both London-Maxwell and time-dependent Ginzburg-Landau (TDGL) techniques.
- \diamond Applied these numerical tools to interpret measurements of vortex dynamics induced by scanning superconducting quantum interference device (SQUID) susceptometry.
- \diamond Constructed two new scanning SQUID microscope systems in cryogen-free fridges, together spanning sample temperatures from 20 mK to over 100 K.
- \diamond Performed scanning SQUID and transport measurements of superconductor-semiconductor hybrid Josephson junction arrays at mK temperatures.

Research Associate

Quantum Circuits, Inc., Supervisors: Rob Schoelkopf & Harvey Moseley

Jan. 2019 – Jan. 2021

New Haven, CT

- \diamond Characterized, modeled, and optimized superconducting devices for quantum information processing using qubits encoded in high-Q microwave cavities.
- \diamond Developed software for quantum control, automated calibration, and quantum device simulation.

Cornell Center for Materials Research REU

Cornell University Department of Physics, Advisor: Dan Ralph

Summer 2016

Ithaca, NY

- \diamond Developed new tools in Python for performing and analyzing GPU-accelerated micromagnetic simulations of spin transfer torque-driven ferromagnetic resonance (ST-FMR) in spintronics devices.

Undergraduate Researcher

Clark University Department of Physics, Advisor: Charles C. Agosta

June 2014 – Dec. 2016

Worcester, MA

- \diamond Performed rf penetration depth measurements of quasi-2D organic superconductors in pulsed and DC magnetic fields using a tunnel diode oscillator (TDO).

TECHNICAL SKILLS

Scientific computing

Python, Git/GitHub, QuTiP, MATLAB, L^AT_EX, Bash, Slurm, JAX, CuPy, HFSS, Sonnet

Low temperature & quantum physics

Superconducting circuits (SQUIDs, qubits, cavities, etc.), cryogenic scanning probe microscopy, two-dimensional materials and devices, instrument control & automation, cryogen-free dilution fridges

PUBLICATIONS

8. Mark E. Barber, Yifan Li, Jared Gibson, Jiachen Yu, Zhanzhi Jiang, Yuwen Hu, Zhurun Ji, Nabhanila Nandi, Jesse C. Hoke, **Logan Bishop-Van Horn**, Gilbert R. Arias, Dale J. Van Harlingen, Kathryn A. Moler, Zhi-Xun Shen, Angela Kou, and Benjamin E. Feldman, *Characterization of Two Fast-Turnaround Dry Dilution Refrigerators for Scanning Probe Microscopy*. *Journal of Low Temperature Physics* **215** (2024).
7. **Logan Bishop-Van Horn**,* Eli Mueller,* and Kathryn A. Moler, *Vortex dynamics induced by scanning SQUID susceptometry*. *Physical Review B* **107**, 224509 (2023). *Equal contribution
6. **Logan Bishop-Van Horn**, *pyTDGL: Time-dependent Ginzburg-Landau in Python*. *Computer Physics Communications* **291**, 108799 (2023).
5. **Logan Bishop-Van Horn**,* Irene P. Zhang,* Emily N. Waite, Ian Mondragon-Shem, Scott Jensen, Junseok Oh, Tom Lippman, Malcolm Durkin, Taylor L. Hughes, Nadya Mason, Kathryn A. Moler, and Ilya Sochnikov, *Local imaging of diamagnetism in proximity coupled niobium nano-island arrays on gold thin films*. *Physical Review B* **106** 054521 (2022) (*Editors' Suggestion*). *Equal contribution
4. **Logan Bishop-Van Horn** and Kathryn A. Moler, *SuperScreen: An open-source package for simulating the magnetic response of two-dimensional superconducting devices*. *Computer Physics Communications* **280**, 108464 (2022).
3. Irene P. Zhang, Johanna C. Palmstrom, Hilary Noad, **Logan Bishop-Van Horn**, Yusuke Iguchi, Zheng Cui, John R. Kirtley, Ian R. Fisher, and Kathryn A. Moler, *Imaging anisotropic vortex dynamics in FeSe*. *Physical Review B* **100**, 024514 (2019).
2. **Logan Bishop-Van Horn**, Zheng Cui, John R. Kirtley, and Kathryn A. Moler, *Cryogen-free variable temperature scanning SQUID microscope*. *Review of Scientific Instruments* **90**, 063705 (2019).
1. Charles C. Agosta, **Logan Bishop-Van Horn**, & Max Newman *The Signature of Inhomogeneous Superconductivity*. *Journal of Low Temperature Physics* **185** (2016).

PREPRINTS

- ◇ Tien-Tien Yeh, Hennadii Yerzhakov, **Logan Bishop-Van Horn**, Srinivas Raghu, Alexander Balatsky *Structured light and induced vorticity in superconductors I: Linearly polarized light*. arXiv:2407.15834 (2024).
- ◇ Tien-Tien Yeh, Hennadii Yerzhakov, **Logan Bishop-Van Horn**, Srinivas Raghu, Alexander Balatsky *Structured light and induced vorticity in superconductors II: Quantum Print with Laguerre-Gaussian beam*. arXiv:2412.00935 (2024).

OPEN SOURCE PROJECTS

pyTDGL	2D time-dependent Ginzburg-Landau in Python
SuperScreen	A package for modeling the linear magnetic response of 2D superconducting devices
SeQuencing	Simulate and benchmark realistic quantum control sequences in QuTiP

TEACHING & MENTORSHIP

Teaching Assistant, Physics 21/22, Mechanics, Fluids, and Heat <i>Stanford University Department of Physics</i>	Sept. 2022 – Dec. 2022 <i>Stanford, CA</i>
Teaching Assistant, Physics 67, Introduction to Laboratory Physics <i>Stanford University Department of Physics</i>	April 2022 – June 2022 <i>Stanford, CA</i>
CAMPARE Graduate Student Mentor <i>Stanford University Department of Physics</i>	June 2018 – August 2018 <i>Stanford, CA</i>
Teaching Assistant, Physics 43, Electricity and Magnetism <i>Stanford University Department of Physics</i>	April 2018 – June 2018 <i>Stanford, CA</i>