

# 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 - Quantum-Enabled Computation August 2024 – present Lexington, MA

- ◊ Technical staff scientist studying noise in 3D-integrated superconducting qubit systems.

### Graduate Student

Stanford University Department of Physics, Advisor: Kathryn A. Moler Sept. 2017 – Jan. 2019, Jan. 2021 – June 2024 Stanford, CA

- ◊ 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.
- ◊ Applied these numerical tools to interpret measurements of vortex dynamics induced by scanning superconducting quantum interference device (SQUID) susceptometry.
- ◊ Constructed two new scanning SQUID microscope systems in cryogen-free fridges, together spanning sample temperatures from 20 mK to over 100 K.
- ◊ 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

- ◊ Characterized, modeled, and optimized superconducting devices for quantum information processing using qubits encoded in high- $Q$  microwave cavities.
- ◊ 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

- ◊ 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

- ◊ 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<sup>A</sup>T<sub>E</sub>X, Bash, Slurm, JAX, CuPy, HFSS, Sonnet, COMSOL

### Low temperature & quantum physics

Classical & quantum superconducting circuits (SQUIDs, qubits, resonators, etc.), superconductor-semiconductor hybrid systems, cryogenic scanning probe microscopy, instrument control & measurement automation, cryogen-free dilution fridges, superconducting qubit readout & control electronics

## PUBLICATIONS

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11. Faranak Bahrami, Matthew P. Bland, Nana Shumiya, Ray D. Chang, Elizabeth Hedrick, Russell A. McLellan, Kevin D. Crowley, Aveek Dutta, **Logan Bishop-Van Horn**, Yusuke Iguchi, Aswin Kumar Anbalagan, Guangming Cheng, Chen Yang, Nan Yao, Andrew L. Walter, Andi M. Barbour, Sarang Gopalakrishnan, Robert J. Cava, Andrew A. Houck, and Nathalie P. de Leon, *Vortex motion induced losses in tantalum resonators*. Physical Review B **113**, 054505 (2026).
10. Tien-Tien Yeh, Hennadii Yerzhakov, **Logan Bishop-Van Horn**, Srinivas Raghu, and Alexander Balatsky, *Quantum printing and induced vorticity in superconductors II: Laguerre-Gaussian beam*. Physical Review Research **7**, 043112 (2025).
9. Tien-Tien Yeh, Hennadii Yerzhakov, **Logan Bishop-Van Horn**, Srinivas Raghu, and Alexander Balatsky, *Quantum printing and induced vorticity in superconductors I: Linearly polarized light*. Physical Review Research **7**, 043111 (2025).
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, Nadia 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).

## OPEN SOURCE PROJECTS

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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

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

