LOGAN BISHOP-VAN HORN

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EDUCATION

Stanford University
M.S. Physics (Jan. 2019), PhD Physics (in progress)
Advisor: Prof. Kathryn A. Moler
Research focus: Local magnetic response and vortex dynamics in two-dimensional superconductors.

Clark University
B.A. Physics & Mathematics, *summa cum laude*, highest honors in Physics (Dec. 2016)
Advisor: Prof. Charles C. Agosta
Honors Thesis: *Investigating the FFLO state in the organic superconductor* λ−$(\mathrm{BETS})_2\mathrm{GaCl}_4$

RESEARCH EXPERIENCE

Graduate Research Assistant Sept. 2017 – Jan. 2019, Jan. 2021 – present
Stanford University Department of Physics, Advisor: Kathryn A. Moler *Stanford, CA*

- ◇ Developed software for simulating the magnetic response of 2D superconducting devices with arbitrary geometry using both London-Maxwell and time-dependent Ginzburg-Landau (TDGL) techniques.
- ◇ Performed large-scale nonlinear programming (NLP) to model the local magnetic response of disordered Josephson junction arrays.
- ◇ Deployed the above software applications on Stanford's Sherlock HPC cluster.
- ◇ Constructed two new cryogen-free scanning Superconducting QUantum Interference Device (SQUID) microscope systems: one capable of measuring samples at temperatures from 3 K to over 100 K, the other capable of measuring samples below 100 mK.

Research Associate Jan. 2019 – Jan. 2021
Quantum Circuits, Inc., Supervisors: Rob Schoelkopf & Harvey Moseley *New Haven, CT*

- ◇ Characterized, modeled, and optimized superconducting devices for quantum information processing using qubits encoded in microwave bosonic modes.
- ◇ Developed software for quantum control, automated calibration, and quantum device simulation.

Cornell Center for Materials Research REU Summer 2016
Cornell University Department of Physics, Advisor: Dan Ralph *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 June 2014 – Dec. 2016
Clark University Department of Physics, Advisor: Charles C. Agosta *Worcester, MA*

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

TECHNICAL SKILLS

Scientific Computing	Python, Git/GitHub, QuTiP, MATLAB, LaTeX, Bash, Slurm, MPI, JAX, finite element electromagnetic & micromagnetic modeling, simulating open quantum systems.
Condensed Matter & Quantum Physics	Superconducting circuits (dc to microwave), transmon qubits & high-Q cavities, scanning probe microscopy, two-dimensional materials and devices, instrument control & automation, cryogenics, cryogen-free dilution fridges.

PUBLICATIONS

7. **Logan Bishop-Van Horn**,* Eli Mueller,* and Kathryn A. Moler, *Vortex dynamics induced by scanning SQUID susceptometry.* arXiv:2304.13093 (2023). *Equal contribution

6. **Logan Bishop-Van Horn**, *pyTDGL: Time-dependent Ginzburg-Landau in Python.* arXiv:2302.03812 (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 **Volume 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 (2016).

PRESENTATIONS

6. *Vortex dynamics induced by scanning SQUID susceptometry.* APS March Meeting 2023, Las Vegas, NV.

5. *Simulating the static magnetic response of thin film superconducting devices.* APS March Meeting 2022 (presented virtually).

4. *Designing, making, imaging and modeling landscapes of superfluid density in two-dimensional superconductors.* Energy Frontier Research Center Quantum Sensing and Quantum Materials (QSQM) Research Symposium, Feb. 15, 2022 (presented jointly with Irene P. Zhang, Emily N. Waite, and Prof. Nadya Mason).

3. *Quantum sensing with superconducting qubits.* Energy Frontier Research Center Quantum Sensing and Quantum Materials (QSQM) Research Symposium, Sept. 10, 2021.

2. *Cryogen-free variable temperature scanning SQUID microscope.* APS March Meeting 2019, Boston, MA.

1. *New details in the superconducting phase diagram of* $\lambda-(\mathrm{BETS})_2\mathrm{GaCl}_4$*: further evidence of a FFLO phase.* APS March Meeting 2017, New Orleans, LA.

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 Sept. 2022 – Dec. 2022
Stanford University Department of Physics *Stanford, CA*

Teaching Assistant, Physics 67, Introduction to Laboratory Physics April 2022 – June 2022
Stanford University Department of Physics *Stanford, CA*

CAMPARE Graduate Student Mentor June 2018 – August 2018
Stanford University Department of Physics *Stanford, CA*

Teaching Assistant, Physics 43, Electricity and Magnetism April 2018 – June 2018
Stanford University Department of Physics *Stanford, CA*

Updated: April 27, 2023