



David Rower

ASPIRING QUANTUM INFORMATION PHYSICIST

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Education

Massachusetts Institute of Technology

Cambridge, MA

PHD, CONDENSED MATTER PHYSICS (IN PROGRESS)

Sep. 2019 - Current

- Advisors: William D. Oliver, Riccardo Comin
- Interests: Superconducting Qubits, Quantum Information, Noise Spectroscopy.
- Fellowships: MIT Dean of Science Fellowship, NSF Graduate Research Fellowship Program, Quantum Information Science and Engineering Network (QISE-NET) Fellowship

University of California, Santa Barbara

Santa Barbara, CA

PHYSICS B.S., MATHEMATICS MINOR

Sep. 2015 - June 2019

- GPA: 4.0/4.0, Degree from College of Creative Studies
- Coursework: Condensed Matter Physics, Analog Electronics, Quantum Mechanics, Statistical Mechanics, General Relativity, Numerical Analysis, Tensor Analysis, Electromagnetism, Network Theory, Nonlinear Dynamics, Classical Mechanics, Intro to Real Analysis, Group Theory, Waves and Kinetic Theory, Linear Algebra, Differential Equations.

Academic Research

Engineering Quantum Systems Group, Photon Scattering Lab

Cambridge, MA

DEPARTMENT OF PHYSICS/RESEARCH LABORATORY OF ELECTRONICS, MIT

Sep. 2019 - Current

- Investigating the microscopic origin of $1/f$ magnetic flux noise through superconducting qubit experiments.
- Exploring material defects of superconducting qubit devices with X-ray spectroscopy techniques.

Atzberger Research Group

Santa Barbara, CA

DEPARTMENT OF MATHEMATICS/DEPARTMENT OF MECHANICAL ENGINEERING, UCSB

Jan. 2016 - June 2019

- Implemented single-bead fluid membrane model in C++ for LAMMPS molecular dynamics engine.
- Studied phase-separation of heterogeneous vesicles with species of different preferred curvatures.
- Created numerical bending rigidity estimator for arbitrary star-shaped vesicles utilizing equilibrium fluctuation spectra.
- Conducted numerical experiments to probe vesicle responses to compression and passage through narrow channels.
- Explored effects of surface fluctuating hydrodynamics on the dynamics of Golestanian swimmers on a sphere.
- Work presented in several conferences via posters and talks.

Pedarsani Research Group

Santa Barbara, CA

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, UCSB

Sep. 2017 - Feb. 2018

- Spearheaded utilization of microscopic traffic simulators for testing and validation of autonomous vehicle traffic models.
- Developed numerical validations of models using the SUMO framework.
- Delivered technical write-up to group for future reference.

Industry Experience

Toyon Research Corporation

Santa Barbara, CA

AUTONOMOUS SYSTEMS INTERN

Jan. 2018 - June 2019

- Developed end-to-end simulation and tracking framework to prototype bearings-only tracking algorithms in Matlab.
- Developed and debugged various components of C++ multi-target tracking framework.
- Developed and implemented advanced dynamics models for use in the tracking of maneuvering targets.
- Developed and implemented continuous integration scripts for automated generation of PDF documentation from markdown repositories.

OpenEye Scientific Software

Santa Fe, NM

OPTIMIZATION INTERN

June 2017 - Sep. 2017

- Developed and tested Hessian-based filters for shape comparison of small molecules.
- Developed and tested convergence criteria for Newton-like optimization algorithms on volume overlap objective functions.
- Tested and debugged proper rigid transformation representations.

- Implemented Remotely Triggered Black Hole (RTBH) system via ExaBGP and the Flask framework to replace legacy system.
- Designed RESTful API to communicate with the RTBH server.
- Developed real-time database logging system on Raspberry Pi to replace legacy system.

Publications

1. **Evolution of $1/f$ Flux Noise in Superconducting Qubits with Weak Magnetic Fields.** D. A. Rower, L. Ateshian, L. H. Li, M. Hays, D. Bluvstein, L. Ding, B. Kannan, A. Almanakly, J. Braumüller, D. K. Kim, A. Melville, B. M. Niedzielski, M. E. Schwartz, J. L. Yoder, T. P. Orlando, J. I.-Jan Wang, S. Gustavsson, J. A. Grover, K. Serniak, R. Comin, and W. D. Oliver. *Physical Review Letters* (2023). [\[link\]](#)
2. **On-demand directional microwave photon emission using waveguide quantum electrodynamics.** B. Kannan, A. Almanakly, Y. Sung, A. Di Paolo, D. A. Rower, J. Braumüller, A. Melville, B. M. Niedzielski, A. Karamlou, K. Serniak, A. Vepsäläinen, M. E. Schwartz, J. L. Yoder, R. Winik, J. I.-Jan Wang, T. P. Orlando, S. Gustavsson, J. A. Grover, and W. D. Oliver. *Nature Physics* (2023). [\[link\]](#)
3. **Coarse-grained methods for heterogeneous vesicles with phase-separated domains: Elastic mechanics of shape fluctuations, plate compression, and channel insertion.** D. A. Rower, P. J. Atzberger. *Mathematics and Computers in Simulation* (2023). [\[link\]](#)
4. **Surface Fluctuating Hydrodynamics Methods for the Drift-Diffusion Dynamics of Particles and Microstructures within Curved Fluid Interfaces.** D. A. Rower, M. Padidar, and P. J. Atzberger. *Journal of Computational Physics* (2022). [\[link\]](#)

Fellowships

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| 2020- | NSF , Quantum Information Science and Engineering Network (QISE-NET) Fellowship |
| 2019- | MIT , Dean of Science Fellowship |
| 2019- | NSF , Graduate Research Fellowship Program (GRFP) |
| 2019 | UCSB , CCS Travel Undergraduate Research Fellowship (TURF) |
| 2018 | UCSB , Research Internships in Science and Engineering (RISE) NSF REU, Atzberger Group |
| 2018 | UCSB , RISE NSF REU, Atzberger Group |
| 2018 | UCSB , RISE NSF REU, Atzberger Group |

Honors & Awards

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| 2021 | iQuHack , Winner, gate-model quantum computing division |
| 2019 | UCSB Physics , Research Excellence Award |
| 2019 | UCSB Physics , Highest Academic Honors |
| 2019 | UCSB Physics , Distinction in the Major |
| 2019 | UCSB Physics , Physics Circus Award |
| 2018 | APS , Future of Physics Days (FPD) Travel Grant |
| 2018 | UCSB Physics , Physics Circus Award |
| 2015-2018 | Andy Goldfarb , Andy Goldfarb Scholarship Award |

Skills

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| Programming | Python, C++, Matlab, Bash, Mathematica, LaTeX, HTML/CSS/JavaScript |
| Software/OS | Ubuntu, Git, Apache Subversion, Labber, Sonnet, HFFS, ParaView, LAMMPS |
| Interfaces | Google APIs, Arduino |
| Credentials | TS, Motorcycle License, Amateur Radio License (KI6PMP) |
| Languages | English |

Outreach & Societies

- Member** American Physical Society (APS)
- Member** Society for Industrial and Applied Mathematics (SIAM)
- Member** Summer Science Program (SSP) Alumni
- Member** UCSB Pops Orchestra (cellist)
- Volunteer** UCSB Physics Circus: an elementary school science outreach program, providing demos and one-on-one interaction
- Volunteer** UCSB SBCC Physics Partnership: a mentorship program to help transfer students succeed in the physics major
- Officer** UCSB Music Connection: a club bringing music to community venues (behavioral health centers, retirement homes, etc.)