David Rower

Aspiring Condensed Matter Physicist

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Education

College of Creative Studies, University of California, Santa Barbara — *Santa Barbara, CA*

Physics B.S. (in progress), Mathematics Minor (completed) — *Sep. 2015 - June 2019*

- GPA: 4.0/4.0
- 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

Atzberger Research Group — *Santa Barbara, CA*

Department of Mathematics/Department of Mechanical Engineering, UCSB — *Jan. 2016 - Current*

- 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 via graph theoretic clustering methods.
- Created numerical bending rigidity estimator for arbitrary star-shaped vesicles utilizing equilibrium fluctuation spectra.
- Conducted active numerical experiments to probe mechanical responses to compression and passage through narrow channels.
- 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 Work/Research

Toyon Research Corporation — *Santa Barbara, CA*

Autonomous Systems Intern — *Jan. 2018 - Current*

- 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.
- Implemented advanced dynamics models for use in tracking filters.
- 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.

UCSB Enterprise Technology Services — *Santa Barbara, CA*

Student Developer — *Feb. 2017 - Sep. 2017*

- 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.

Presentations

Heterogeneous Vesicles with Phases having Different Preferred Curvatures: Shape Fluctuations and Mechanics of Active Deformations

Apr. 2019 **Poster Presenter,** Southern California Applied Mathematics Symposium (SOCAMS 2019) — *Pasadena, CA*

Mar. 2019 **Speaker,** American Physical Society March Meeting (APS March) 2019 — *Boston, MA*

Passive and Active Explorations of Shape-Driven Mechanics in Mixed Species Lipid Vesicles

Dec. 2018 **Speaker,** UCSB Research Internships in Science and Engineering (RISE) NSF REU Research Symposium *Santa Barbara, CA*

Bearings-Only Tracking: Single vs. Multiple Gaussian Methods

Oct. 2018 **Speaker,** Autonomous Systems Team Meeting, Toyon Research Corporation *Santa Barbara, CA*

Equilibrium Shape Fluctuations of Heterogeneous Biological Membranes

Aug. 2018 **Minisymposium Speaker,** SIAM Conference on the Life Sciences (SIAM LS 18) *Minneapolis, MN*
June 2018 **Speaker,** UCSB RISE NSF REU Research Symposium *Santa Barbara, CA*

Curvature-Driven Phase-Separation on Spherical Vesicles: Insights from a Single-Bead Model

Apr. 2018 **Poster Presenter,** Southern California Applied Mathematics Symposium (SOCAMS 2018) *Santa Barbara, CA*
Mar. 2018 **Poster Presenter,** American Physical Society March Meeting (APS March 2018) *Los Angeles, CA*

Can Hessians improve ROCS?

Sep. 2017 **Speaker,** OpenEye Scientific Software Internship Symposium *Santa Fe, NM*

Self-Assembled Lipid Bilayer Membranes: Exploring a Single-Bead Model

May 2017 **Poster Presenter,** UCSB Undergraduate Research Colloquium *Santa Barbara, CA*

Skills

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

Honors & Fellowships

2019 **Fellow,** MIT Dean of Science Fellowship
2019 **Fellow,** NSF Graduate Research Fellowship Program (NSF GRFP)
Winter 2019 **Recipient,** UCSB CCS Travel Undergraduate Research Fellowship (TURF)
Winter 2019 **Participant,** UCSB Research Internships in Science and Engineering (RISE), NSF REU, Atzberger Group
Fall 2018 **Participant,** UCSB RISE, NSF REU, Atzberger Group
Spring 2018 **Participant,** UCSB RISE, NSF REU, Atzberger Group
Spring 2018 **Recipient,** APS Future of Physics Days (APS FPD) Travel Grant
Spring 2018 **Recipient,** UCSB Physics Circus Award
2015-2018 **Recipient,** Andy Goldfarb Scholarship Award

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.)