Bryan T. Weinstein

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Education

- **Harvard University** — Cambridge, MA
  PhD in Applied Physics — *Expected May 2018*
  - Working Thesis Title: *Experimental Microbial Evolutionary Dynamics and Transport*
  - Designed experiments to study microbial colony growth on the surface of complex fluids and materials; applied stochastic, random-walk methods to model colony evolutionary dynamics
  - Utilized fluid and solid mechanics to simulate microbial colony morphology
- **Harvard University** — Cambridge, MA
  PhD Secondary Field: Computational Science and Engineering (CSE) — *Expected May 2018*
  - Completed advanced applied math and scientific computing courses
  - Learned state-of-the-art computational methods used in scientific research and data science
  - **Capstone:** Developed an OpenCL powered Lattice Boltzmann fluid mechanics simulation utilizing OpenGL for real-time visualization.
- **Harvard University** — Cambridge, MA
  S.M. in Applied Physics — *November 2014*
  - Completed 12 courses: 4 physics core courses, 4 CSE courses, and 4 soft-matter/biophysics electives
  - GPA: 3.95/4.00
- **Case Western Reserve University** — Cleveland, OH
  Bachelor of Science in Engineering, Engineering Physics — *May 2012*
  - GPA: 4.00/4.00, Summa Cum Laude, Valedictorian
  - Engineering Concentration: Aerospace Engineering
  - Senior Project: Simulating Interactions between Confined Spins and Ferromagnetic Vortices

Certifications

- **Engineer in Training (EIT)** — Ohio
  Active — *September 2012*
  - Successfully passed Fundamentals of Engineering Exam, the first step towards becoming a licensed Professional Engineer (PE)

Engineering Skills

- ***Summary*:** Expert ability to create experiments, models, and numerical simulations to study the transport of mass, momentum, and energy in complex fluids and materials
- **Analytical and Numerical Skills**
  - Ability to mesh and simulate fluid flows containing chemical reactions using standard open-source tools (OpenFOAM, gmsh, SALOME) or custom-built GPU-powered Lattice Boltzmann tools
  - Experience simulating multicomponent multiphase flows using the Lattice Boltzmann technique
  - Expert knowledge of Applied Mathematics, including stochastic modeling involving the Master equation, the Fokker-Planck equation (PDEs), and (spatial) stochastic differential equations
  - Ability to use core physics training to create and calibrate models to match experiments
- **Experimental Skills**
  - Adept at designing and conducting biological and soft matter experiments involving complex fluids and materials; four years of research in a molecular biology laboratory
  - Expertise in use of rheometers to quantify fluid rheology, microscopy to image microbial colonies, and computational tools to analyze images

Computational Skills

- Developed over 30 GitHub repositories and wrote hundreds of Jupyter/IPython notebooks to create scientific simulations and analyze experimental data during my PhD (see my website above)
- Over 8 years of experience optimizing programs to run on multiple processors, graphics processing units (GPUs), and supercomputers
- Expert at using Jupyter/IPython Notebooks to explore, visualize, and analyze large tabular datasets and large collections of images
- Experienced at applying stochastic techniques to model and solve high-dimensional problems
- **Languages for General Scientific Computing:**
  - Python, Cython, OpenCL, CUDA, C, C++, Java, Mathematica, Matlab
- **Selected Python Packages and Tools:**
  - IPython/Jupyter Notebook, matplotlib, seaborn, numpy, scipy, pandas, scikit-image, pymc3, cython, cython_gsl, PyOpenCL, PyCuda
- **Fluid and Solid Mechanics Simulations:**
  - Lattice Boltzmann Method (custom-built code), OpenFOAM, SALOME, gmsh
- **Image Analysis Tools**
  - Python, OpenCL, ImageJ/Fiji

Fellowships and Awards

- **Institute for Applied Computational Science Scholarship** Cambridge, MA
  Graduate Student *September 2016 - September 2017*
  - Wrote proposal and won a $25,000 student scholarship from Harvard's Institute for Applied Computational Science (IACS)
  - Used funds to further develop my IACS capstone: an OpenCL-powered Lattice Boltzmann fluid mechanics simulator utilizing OpenGL for real-time visualization
- **Department of Energy Office of Science Graduate Fellowship** Washington, D.C.
  Graduate Student *September 2012 - September 2015*
  - Wrote proposal to win a competitive fellowship that supports students pursuing training in areas relevant to Department of Energy (DOE). Selected out of 1,300 applicants; 50 fellowships awarded
  - Attended yearly conferences at National Laboratories; presented posters on my active research, networked with other DOE fellows and government officials
- **Harvard University Pierce Fellow** Cambridge, MA
  Graduate Student *September 2012 - September 2015*
  - Won fellowship awarded to the highest caliber PhD students accepted into Harvard's School of Engineering and Applied Sciences (SEAS). Selected out of 150 students; 8 fellowships awarded

Publications

[1] Bryan T. Weinstein, Maxim O. Lavrentovich, et al. "Genetic Drift and Selection in Many-Allelle Range Expansions." In: *PLOS Computational Biology* 13.12 (Dec. 2017). Article chosen for journal cover photo, e1005866. DOI: 10.1371/journal.pcbi.1005866. URL: http://dx.plos.org/10.1371/journal.pcbi.1005866.

[2] B. T. Weinstein, S. Atis, et al. "Microbial Range Expansions on Liquid Substrates." In: *Physical Review X* 9.2 (June 2019). Equal first co-author. DOI: 10.1103/physrevx.9.021058. URL: https://doi.org/10.1103/PhysRevX.9.021058.

[3] Severine Atis, Bryan T. Weinstein, et al. *Rocket yeast*. Video. Milton van Dyke Award as part of the DFD Gallery of Fluid Motion. Nov. 2021. DOI: 10.1103/physrevfluids.6.110507. URL: https://doi.org/10.1103/PhysRevFluids.6.110507.

Professional Organizations

- Tau Beta Pi Engineering Honor Society
- American Physical Society