

Bryan T. Weinstein

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Education

- **Harvard University** Cambridge, MA
PhD in Applied Physics May 2018
 - Thesis Title: *Microbial Evolutionary Dynamics and Transport on Solid and Liquid Substrates*
 - Advisors:
 - * David R. Nelson: Professor of Physics and Applied Physics, Solomon Professor of Biophysics
 - * Andrew W. Murray: Herschel Smith Professor of Molecular Genetics, Professor of Molecular and Cellular Biology, Director of FAS Center for Systems Biology
 - Additional members of thesis committee:
 - * Christopher Rycroft
 - * Michael Brenner
- **Harvard University** Cambridge, MA
PhD Secondary Field: Computational Science and Engineering (CSE) May 2018
 - Completed four advanced applied math and scientific computing courses
 - Learned state-of-the-art computational methods used in scientific research
 - **Capstone:** OpenCL GPU-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
- **Fairport High School** Fairport, NY
High School May 2012
 - GPA: 98.7/100, Class Valedictorian of 598 students

Graduate Fellowships and Awards

- **Institute for Applied Computational Science Scholarship** Cambridge, MA
Harvard University 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 develop a GPU-powered Lattice Boltzmann fluid mechanics simulation
- **Certificate of Distinction in Teaching** Cambridge, MA
Bok Center, Harvard University September - May 2016
 - Won a teaching award based on my high reviews of "Introduction to Applied Mathematics" taught to undergraduates; obtained a 4.86/5.00

- Department of Energy Office of Science Graduate Fellowship**
Washington, D.C.
Harvard University Graduate Student
September 2012 - September 2015
 - Wrote proposal to win competitive fellowship supporting 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
Harvard University 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-Allele Range Expansions”. Submitted. 2017. URL: <http://biorxiv.org/content/early/2017/06/07/145631>.

Conferences and Invited Presentations

- [1] Bryan T. Weinstein, Severine Atis, et al. “Experimental Population Dynamics in Fluid Flows”. In: *Annual Meeting of the International Physics of Living Systems (iPoLS) Network*. Poster Presentation. Harvard University, July 2016.
- [2] Severine Atis, Bryan T. Weinstein, et al. “Experimental Population Dynamics in Fluid Flows”. In: *American Physical Society, March Meeting*. Presentation. New Orleans Morial Convention Center, Mar. 2017.
- [3] Bryan T. Weinstein, Maxim O. Lavrentovich, et al. “Diffusion and Selection in Many-Allele Range Expansions”. In: *American Physical Society, March Meeting*. Presentation. New Orleans Morial Convention Center, Mar. 2017.

Summer Schools

- Marine Biological Laboratory Physiology Course**
Woods Hole, MA
Student
June 2014 - August 2014
 - Applied and accepted into intense 7 week course focused on intersection of experiment and theory in cellular physiology
 - Learned how to use state-of-the-art microscopy to examine cellular behavior
 - Interacted with leading cellular physiology researchers in daily lectures and seminars
 - Course taught by Rob Phillips, Jennifer Lippincott-Schwartz, Wallace Marshall

Graduate Research

- Harvard University**
Cambridge, MA
David R. Nelson & Andrew Murray: Physics, Molecular and Cellular Biology
Sept 2013 - Present
 - Combined nonequilibrium statistical mechanics and experimental molecular biology to quantify the evolutionary dynamics of microbial range expansions
 - Learned experimental biology techniques (trained in Dr. Andrew Murray’s Lab)
 - Captured images via microscopy; utilized Python and ImageJ extensively for analysis
 - Devised algorithms to analyze and visualize large sets of biological data

- Developed agent-based and Lattice-Boltzmann simulations of range expansions in Python, C++, and OpenCL
- Used OpenFoam and the Lattice-Boltzmann technique to simulate fluid flows
- Created analytical models utilizing stochastic methods to predict experimental results

Specialized Skills

• Computational

- Secondary Field in Computational Science and Engineering (PhD minor)
 - * Significant experience optimizing programs to run on multiple processors, graphics processing units, and supercomputers.
 - * Excellent at designing and running simulations to gain insight into complicated problems
 - * Knowledge of stochastic and probabilistic methods to solve high-dimensional problems
- Software:
 - * Languages for Scientific Computing:
 - Python, Cython, OpenCL, CUDA, C, C++, Java, Matlab, Mathematica
 - * Tools for Fluid Mechanics Simulations:
 - Lattice Boltzmann Method (custom-built code), OpenFOAM, SALOME
 - * Image Analysis Tools:
 - ImageJ, Python, OpenCL, OMERO
 - * Other Selected Languages & Programs :
 - Netlogo, Axiovision, Origin, Igor, Bash, L^AT_EX, Windows Powershell, Wordpress, HTML, CSS
- Hardware:
 - * Build customized computers for scientific applications

• Analytical

- Expert knowledge of Applied Mathematics, especially partial differential equations and stochastic methods
- Deep understanding of state-of-the-art equilibrium and nonequilibrium statistical physics methods

• Laboratory

- 4 years of research in an experimental molecular biology laboratory; experienced at designing and conducting experiments
- Significant experience using microscopy to image microbes

Certifications / Clearances

• Engineer in Training (EIT)

Active

Ohio

September 2012

- Successfully passed Fundamentals of Engineering Exam, the first step towards becoming a licensed engineer

• Interim Secret Clearance

Active

MITRE, Bedford MA

September 2018

Professional Organizations

- Tau Beta Pi Engineering Honor Society
- American Physical Society

Teaching Experience

- **Introduction to Applied Mathematics** Harvard University
Teaching Fellow *September – May 2016*
 - Undergraduate course taught by Christopher Rycroft. I obtained a 4.86/5.00 on teaching reviews
 - Won a teaching award, the Certificate of Distinction in Teaching from the Bok Center, for the high teaching reviews
- **Statistical Physics** Harvard University
Teaching Fellow *Fall 2017*
 - Graduate course taught by David Nelson, my PhD advisor. I obtained a 4.35/5.00 on teaching reviews

Outreach

- **Adopt a Physicist** <https://www.adoptaphysicist.org/>
Classroom Discussion Facilitator *October 2018*
 - Answered questions about being a physicist to high school physics classes in an online forum
 - Helped make students excited about physics
- **STEM Inspiration Organization** Newton, MA
Interview *October 2018*
 - Participated in hour long interview to organization supporting high school students interesting in pursuing careers in STEM fields
 - Discussed my career trajectory and life lessons that I learned along the way
 - Transcript of interview can be seen [here](#)
- **Science in the News Presentation** Cambridge, MA
Physics of Evolution *November 2014*
 - Described how physics-based models can be used to predict evolutionary trajectories to the public in a 1.5 hour talk
 - Presentation and was given to approximately 100 members of the public at Harvard Medical School
 - Worked closely with teammates to create an effective presentation

Graduate References

- **Dr. David Nelson** Professor of Physics, Applied Physics, Biophysics
Harvard University
 - *Relationship:* Current Research Advisor
 - *Email:* nelson@seas.harvard.edu
 - *Phone:* (617) 495-8852
- **Dr. Andrew Murray** Professor of Molecular Genetics, Molecular Cellular Biology
Harvard University
 - *Relationship:* Current Research Advisor
 - *Email:* amurray@mcb.harvard.edu
 - *Phone:* (617) 496-1350

Undergraduate CV

Undergraduate Research

- **Rochester Institute of Technology** Rochester, NY
George Thurston: Physics *May 2010 - August 2012*
 - Studied liquid crystal mixtures in the eye related to cataracts
 - Developed computer simulations and animations with Mathematica
 - Demonstrated how liquid crystal composition affects the refractive index of the eye
 - Validated simulations with experimental data
 - Prepared results for scientific publication
- **Case Western Reserve University** Cleveland, OH
Jesse Berezovsky: Physics *Aug 2010 - May 2012*
 - Examined control of optically active nanocrystal quantum dots (QDs) at room temperature using microscopic ferromagnet magnetization dynamics
 - Studied novel combinations of QDs and microscopic ferromagnets using the “Object Oriented Micro-Magnetic Framework” developed by National Institute of Standards and Technology
 - Analyzed data from simulations with Matlab and other Linux-based tools
 - Created custom animations to visualize simulations
 - Identified ferromagnet-spin interactions relevant to room-temperature quantum computing
- **Princeton Plasma Physics Laboratory** Princeton, NJ
Harry Mynick: Theory and Computation Department *May 2011 - Aug 2011*
 - Participated in “Science Undergraduate Laboratory Internship” through Department of Energy
 - Designed graphical front end for previously developed Mathematica program that calculated important plasma physics quantities
 - Utilized state-of-the-art computer cluster for scientific computing
 - Distributed redesigned program to plasma physicists for broad usage
- **Case Western Reserve University** Cleveland, OH
Corbin Covault: Physics *Sep 2009 - May 2010*
 - Identified faulty equipment at the Pierre Auger Cosmic Ray Observatory by analyzing data collected by 1600 Cherenkov surface detectors
 - Created programs to monitor detector performance in real time
 - Used findings to design improved surface detectors being built at “Northern Auger Site” in Colorado
- **Case Western Reserve University** Cleveland, OH
Mark Gridley: SAGES department *Jan 2009 - Aug 2009*
 - Designed a psychology study examining cross-modal perception of music
 - Administered study to over 50 participants and analyzed results
 - Co-authored a paper that was subsequently published in a peer-reviewed journal

Undergraduate Awards

- **Case Alumni Association Prize** Cleveland, OH
Case Western Reserve University *5/2012*
 - Awarded to the graduating senior with the best academic record in the Case Western School of Engineering.
- **Elmer C. Stewart Memorial Award** Cleveland, OH
Case Western Reserve University *5/2012*

- Awarded to an outstanding senior in Physics who has demonstrated achievement in the applications of physics.
- **B.S. Chandrasekhar Prize** Cleveland, OH
Case Western Reserve University 5/2011
 – Received for demonstrating superior performance in physics.
- **Rochester Engineering Society Scholarship** Rochester, NY
Rochester Engineering Society 5/2011
 – Merit-based award recognizing outstanding engineering, engineering technology, science, or technology students from the Rochester area.
- **Outstanding Junior Award** Cleveland, OH
Case Western Reserve University 5/2011
 – Awarded to juniors with the best academic record at the end of five semesters in the Case School of Engineering.
- **National Edward O'Connor Scholarship** Cleveland, OH
Aerospace States Association 8/2010
 – Awarded to enterprising and innovative students planning to pursue career in Aerospace Engineering; only two scholarships given in the nation.
- **Case Alumni Scholarship** Cleveland, OH
Case Western Reserve University 5/2010
 – Competitive award given to undergraduates pursuing degree related to applied science.
- **Outstanding Sophomore Award** Cleveland, OH
Case Western Reserve University 5/2010
 – Awarded to sophomores with the best academic record at the end of three semesters in the Case School of Engineering.
- **Provost's Scholarship** Cleveland, OH
Case Western Reserve University 8/2008
 – Received when entering Case Western Reserve University based on high-school accomplishments (was high school valedictorian of class of 598 students).

Undergraduate References

- **Dr. George Thurston** Professor of Physics
Rochester Institute of Technology
 – *Relationship:* Previous Research Advisor
 – *Email:* georgemthurston@gmail.com
 – *Phone:* (585) 475-4549
- **Dr. Jesse Berezovsky** Assistant Professor of Physics
Case Western Reserve University
 – *Relationship:* Previous Research Advisor
 – *Email:* jab298@case.edu
 – *Phone:* (216) 368-4034
- **Dr. Walter Lambrecht** Professor of Physics
Case Western Reserve University
 – *Relationship:* Undergraduate Academic Advisor
 – *Email:* walter.lambrecht@case.edu
 – *Phone:* (216) 368-6120
- **Dr. Harry Mynick** Principal Research Physicist
Princeton Plasma Physics Laboratory
 – *Relationship:* Previous Research Advisor
 – *Email:* hmynick@pppl.gov
 – *Phone:* (609) 243-2769