Bryan T. Weinstein

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Work Experience

- **MITRE**   Bedford, MA
  Senior Modeling and Simulation Engineer/Analyst   *September 2018*
  - **September 2018 - October 1st 2019**
    * Recruited many students at career fairs through academic engagement, and drew people to CUIC team (at least 4 people hired or interned)
    * Helped save the Functional Architecture December demo for a sponsor
    * Started the AFSIM user community at MITRE, taught many courses
    * Attended AFSIM user community meeting October 2018
    * Maintained interim security clearance, obtained full secret, working on Top Secret
    * Helped to point the Functional Architecture in the correct direction. Now building it in AFSIM.
    * Gave talk at MDC2 flip the script talk to preston Dunlap and AFWIC general
    * Gave talk at AFSIM Usergroup meeting in Ohio about MITRE Platforms / MDC2 Base Types
    * Helped lead a small technical team to create AFSIM version of the FA with tight deadlines
    * Mentored Fiona Henry and Min Kim, still getting them up to speed

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] B. T. Weinstein, S. Atis, et al. "Microbial Range Expansions on Liquid Substrates". In: *Physical Review X* 9.2 (June 2019). First co-author. DOI: 10.1103/physrevx.9.021058.

[2] 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. URL: http://dx.plos.org/10.1371/journal.pcbi.1005866.

Conferences and Invited Presentations

[1] Bryan T. Weinstein. "MDC2 Base Types: a repository of platforms that makes AFSIM more user friendly". In: *Spring AFSIM User's Conference*. Presented a talk on creating an unclassified repository of blue assets for AFSIM. Beavercreek, Ohio, Mar. 2019.

[2] Bryan T. Weinstein. "Strike Task Broker". In: *Multi-Domain Command and Control Advanced Battle Management System: Flip the Script Pitch Event*. Presented to Chief Architect of Airforce, Preston Dunlap, and 1-star general about work. John Hopkins University Applied Physics Laboratory, June 2019.

[3] S. Atis, B. T. Weinstein, et al. "On Growth and Form of Range Expansions at Liquid Interfaces". In: *Bulletin of the American Physical Society*. American Physical Society. Los Angeles, CA, Mar. 2018.

[4]   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.

[5]   Bryan T. Weinstein, Maxim O. Lavrentovich, et al. "Diffusion and Selection in Many-Allele Range Expansions". In: *Bulletin of the American Physical Society*. Presentation. New Orleans Morial Convention Center, Mar. 2017.

[6]   Bryan T. Weinstein, Severine Atis, et al. "Experimental Population Dynamics in Fluid Flows". In: *Annual Meeting of the International Physics of Living Sytems (iPoLS) Network*. Poster Presentation. Harvard University, July 2016.

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, LaTeX, 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)**   Ohio
  Active   *September 2012*

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

- **Secret Clearance**   MITRE, Bedford MA
  Active   *September 2018*
- **Interim Top Secret Clearance**   MITRE, Bedford MA
  Active   *April 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 (SIO)**   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