

# Bryan T. Weinstein

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## Education

- **Harvard University** Cambridge, MA  
*PhD in Applied Physics* Expected May 2018
  - 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
  - GPA: 3.96/4.00

*PhD Secondary Field: Computational Science and Engineering* Expected May 2018

  - Took four advanced applied math and scientific computing courses
  - Learned how to use state-of-the-art computational methods in scientific research
  - Defended work in front of committee

*S.M. in Applied Physics* Expected May 2014

  - Completed 10 courses
- **Case Western Reserve University** Cleveland, OH  
*Bachelor of Science in Engineering, Engineering Physics* May 2012
  - GPA: 4.00/4.00 (Summa Cum Laude)
  - Engineering Concentration: Aerospace Engineering
  - Senior Project: Simulating Interactions between Confined Spins and Ferromagnetic Vortices

## Fellowships

- **Department of Energy Office of Science Graduate Fellowship** Washington, D.C.  
*Graduate Student* September 2012 - September 2014
  - Wrote proposal to win competitive fellowship supporting students pursuing training in areas relevant to Department of Energy (DOE)
  - Selected out of 1,300 applicants; only 50 fellowships awarded
  - Attended yearly conferences at National Laboratories; networked with other fellows and government officials
- **Harvard University Pierce Fellow** Cambridge, MA  
*Graduate Student* September 2012 - September 2014
  - 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; only 8 fellowships awarded

## 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 how to perform biological experiments in Dr. Andrew Murray's lab
  - Captured images via fluorescent microscopy; utilized Python and ImageJ extensively for analysis

- Analyzed and visualized extremely large sets of biological data
- Created simulations in Python and C++ to model range expansions

- **Harvard University**

Cambridge, MA

*Phillipe Chuzel: Applied Physics, Molecular and Cellular Biology*

Jan 2013 - Sept 2013

- Extended previous model to predict how spherical tumors respond to pairwise combinations of drugs
- Learned how to use a tissue culture room and grew multiple tumor cell lines
- Imaged tumors using standard microscopy techniques; used ImageJ to determine their sizes
- Installed and maintained an OMERO image analysis server to help store and quantify images

- **Harvard University**

Cambridge, MA

*Joanna Aizenberg: Materials Science, Chemistry, Chemical Biology*

Sept 2012 - Jan 2013

- Studied the mechanism by which water droplets coordinate their motions and form patterns on biomimetic hydrophobic surfaces
- Tracked motion of hundreds of randomly moving and merging droplets using ImageJ
- Created simulation in C++ to model droplet motion and compared it with experimental results

## 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
- Created 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
- Uncovered 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

## Publications & Presentations

- [1] B. Weinstein, J. Aizenberg, P. Cluzel, and D. Nelson. On emergent macroscopic behaviors imparted by microscopic rules. In *DOE SCGF Fellows Annual Meeting 2013*, SLAC National Accelerator Laboratory, Lawrence Berkeley National Laboratory, July 2013. DOE SCGF. Poster Presentation.
- [2] B. Weinstein and J. Berezovsky. Simulating Magnetization Dynamics of Ferromagnetic Vortices. Technical report, Case Western Reserve University Department of Physics, Cleveland, May 2012.
- [3] B. Weinstein and J. Liu. A graphical interface for the plasma apprentice: Easier access to plasma physics knowledge. In *Princeton Plasma Physics Laboratory's Annual End-of-Summer Poster Session*, Princeton, NJ, August 2011. Princeton Plasma Physics Laboratory. Poster Presentation.
- [4] B. Weinstein, J. Liu, H. Mynick, and E. Feibush. A graphical interface for the Plasma Apprentice: Easier access to plasma physics knowledge. *Journal of Undergraduate Research*, 11, 2011.
- [5] Bryan T. Weinstein and Mark C. Gridley. Visual Perception of Music. *Psychology Journal*, 7(3), 2010.

## 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  
5/2010  
*Case Western Reserve University*
  - 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  
8/2008  
*Case Western Reserve University*
  - Received when entering Case Western Reserve University based on high-school accomplishments, such as being the valedictorian of high-school class of 598 students.

## Specialized Skills

- **Analytical**
  - Knowledge of state-of-the-art equilibrium and nonequilibrium statistical physics methods
  - Expert knowledge of Applied Mathematics, especially partial differential equations
  - Expertise utilizing Mathematica to solve complex physical problems
  - Deep understanding of Bayesian inference in data analysis
- **Computational**
  - Secondary Field in Computational Science and Engineering (part of PhD)
    - \* Significant experience optimizing programs to run on multiple processors, graphics processing units, and supercomputers.
    - \* Expert at analyzing and visualizing “Big-Data”
    - \* Excellent at designing and running simulations to gain insight into complicated problems
    - \* Knowledge of stochastic methods to solve high-dimensional problems
  - *Software*:
    - \* Favorite Languages for Scientific Computing:
      - Python, C++, CUDA, Matlab, Mathematica, Java
    - \* Image Analysis Tools:
      - ImageJ, Python, OpenCV, OMERO
    - \* Additional Selected Programs :
      - Netlogo, Axiovision, Origin, Igor, Bash, L<sup>A</sup>T<sub>E</sub>X, Windows Powershell, Wordpress, HTML, CSS
  - *Hardware*:
    - \* Build customized computers for scientific applications
- **Laboratory**
  - Biology:
    - \* Basic wet-lab experience
    - \* Basic tissue culture room experience
  - Physics:
    - \* Signal analysis instrumentation
    - \* Spectroscopy, multi-channel analyzers, photomultiplier tubes
    - \* Ultra-high vacuum surface science
    - \* Ultrasonic methods to determine material properties
    - \* Experimental methods to analyze chaotic systems

## Certifications

- **Engineer in Training (EIT)** Ohio  
September 2012  
*Active*
  - Successfully passed Fundamentals of Engineering Exam

## Professional Organizations

- Tau Beta Pi Engineering Honor Society

## Graduate References

- **Dr. David Nelson** Professor of Physics, Applied Physics, Biophysics  
*Harvard University*
  - *Relationship:* Research Advisor
  - *Web Page:* <http://www.seas.harvard.edu/directory/nelson>
  - *Email:* nelson@seas.harvard.edu
  - *Phone:* (617) 495-8852
- **Dr. Andrew Murray** Professor of Molecular Genetics, Molecular Cellular Biology  
*Harvard University*
  - *Relationship:* Research Advisor
  - *Web Page:* <https://www.mcb.harvard.edu/mcb/faculty/profile/andrew-w-murray/>
  - *Email:* amurray@mcb.harvard.edu
  - *Phone:* (617) 496-1350

## Undergraduate References

- **Dr. George Thurston** Professor of Physics  
*Rochester Institute of Technology Department of Physics*
  - *Relationship:* Previous Research Advisor
  - *Web Page:* <http://www.rit.edu/cos/george-thurston>
  - *Email:* georgemthurston@gmail.com
  - *Phone:* (585) 475-4549
- **Dr. Jesse Berezovsky** Assistant Professor of Physics  
*Case Western Reserve University Department of Physics*
  - *Relationship:* Previous Research Advisor
  - *Web Page:* <http://www.phys.cwru.edu/faculty/index.php?berezovsky>
  - *Email:* jab298@case.edu
  - *Phone:* (216) 368-4034
- **Dr. Walter Lambrecht** Professor of Physics  
*Case Western Reserve University Department of Physics*
  - *Relationship:* Undergraduate Academic Advisor
  - *Web Page:* <http://www.phys.cwru.edu/faculty/index.php?lambrecht>
  - *Email:* walter.lambrecht@case.edu
  - *Phone:* (216) 368-6120
- **Dr. Harry Mynick** Principal Research Physicist  
*Princeton Plasma Physics Laboratory*
  - *Relationship:* Previous Research Advisor
  - *Web Page:* <http://w3.pppl.gov/theory/mynick.html>
  - *Email:* hmynick@pppl.gov
  - *Phone:* (609) 243-2769