

# Benjamin N. Wiener

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## Skills

Computing	Modeling and Simulation, Optimization, Mathematical Analysis
Languages	Python, Mathematica, MATLAB, JavaScript, C/C++
Packages	NumPy/SciPy, OpenCV, PyTorch, Keras/TensorFlow, Gurobi, OR-Tools, OpenAI Gym, ROS
Programs	GNU/Linux, COMSOL, Solidworks/OnShape, Adobe Illustrator, LaTeX
Laboratory	Microfabrication, Electron Microscopy, Digital Electronics, Microcontroller Programming

## Education

2012 – 2019	<b>Brown University, PhD in Physics</b> Performed the first measurement of ionic motion in a liquid viscosity gradient. Helped develop a new electrospray mass spectrometer with the goal of analyzing and sequencing proteins and other biopolymers. Thesis: <i>Electrokinetic current driven by a viscosity gradient</i> Adviser: Prof. Derek Stein
2007 – 2011	<b>Brandeis University, BS in Physics</b> Built and tested electronics for the ATLAS muon detector alignment system. Diagnosed an intermittently misbehaving circuit and modified its design. Thesis: <i>Determining the ATLAS muon momentum resolution from Z and high mass Drell-Yan events.</i> Adviser: Prof. Craig Blocker

## Experience

2012 – 2019	<b>PhD Researcher and Postdoctoral Research Associate</b> , Brown University Devised experiments on random motion and mass spectrometry. Designed and built experimental apparatuses using OnShape, SolidWorks, and 3D printing. Wrote automation and data collection software using Python and MATLAB. Analyzed data with Python and Mathematica. Analyzed images and videos using OpenCV. Modeled and simulated physical systems using Python and Mathematica.
2018 – Present	<b>Partner and Co-Founder</b> , Perciplex, LLC Provided technical consulting services in the areas of optimization and artificial intelligence. Tested the technical viability of a networking concept using C++ and Omnet++. Information constrained by NDA.
2015 – Present	<b>Co-Founder</b> Sheepdog, LLC Built a JavaScript/AngularJS web application for tracking attendance at pre-schools and after-school programs. This app is used daily and we continue to maintain it.
2011 – 2012	<b>Research Technician</b> , CERN/Brandeis University, Geneva, Switzerland

Helped install, test, and debug ATLAS muon spectrometer alignment devices. Wrote Tcl/Tk software, helped build, and helped test the ATLAS Long Guide Tube, designed to replace the ATLAS beam pipe. Wrote C++ code for a particle track based measurement of ATLAS muon spectrometer alignment.

## Independent Projects

Cart-pole	Designed and built a cart-pole/inverted pendulum using OnShape, 3D printing, and microcontrollers for control theory and reinforcement learning experiments. Used OpenCV to optically determine the state of the system. Wrote software for swing-up and inverted balancing using Python.
Portrait Drawing Robot	Designed and built a 2D pen plotting robot using OnShape, 3D printing, and microcontrollers. Wrote software using OpenCV to capture a photo of a person and convert it to a line drawing for plotting.
Quadcopter	Built a quadcopter controlled by an onboard computer using Python.
Laser Table	Produced an interactive art project where users could draw on a phosphorescent surface using laser light. Built a laser aiming robot using microcontrollers. Developed a web app for collaborative control of the robot I using JavaScript, Node.js, and Socket.io.
SpaceAdventure	Created an interactive 3D augmented reality art project for smartphones using JavaScript, Three.js, ARToolKit, and Socket.io.
Battle Bot	Designed and built an electronically controlled, pneumatically powered axe wielding battlebot.

## Publications and Presentations

2016	Maulbetsch, W., Wiener, B., Poole, W., Bush, J., & Stein, D. (2016). <b>Preserving the sequence of a biopolymer's monomers as they enter an electrospray mass spectrometer</b> . Physical Review Applied, 6(5), 054006.
2017	J., Maulbetsch, W., Lepoitevin, M., Wiener, B., Mihovilovic Skanata, M., Moon, W., Stein, D. <b>The nanopore mass spectrometer</b> . Review of Scientific Instruments, 88(11), 113307.
	Wiener, B., & Stein, D. (2018).
2018	<b>Noise-Driven Drift in a Viscosity Gradient</b> . arXiv preprint arXiv:1807.09106.
2015	<b>Noise and Ionic Conductivity in Glass Nanochannels</b> , APS March Meeting
2017	<b>Brownian Motion in a Viscosity Gradient</b> , Flow17 Conference
2018	<b>Electrokinetic Current Driven by a Viscosity Gradient</b> , APS March Meeting
2019	<b>Development of a Mass Spectrometer for Sequencing Single Proteins</b> , APS March Meeting

## Interests

Programming	Many projects including web apps, video games, and interactive demos
Robotics	Self-balancing inverted pendulum, portrait drawing robot, quadcopters, axe wielding battlebot
Machine Learning/AI	Online courses and experiments with PyTorch and Keras/Tensorflow
Electronics	Projects and experiments with microcontrollers and radio (KC1EVW)
Woodworking	Furniture, boats, trebuchet
Backpacking	Pemi Loop, AT section hikes, Presidential Range