

## EDUCATION

**University of Illinois***Ph.D., Physics*

Advisor: Brian DeMarco

Dissertation: *Ultracold Atoms in a Disordered Optical Lattice*

Urbana-Champaign, IL

2009

**University of California, Santa Barbara***B.S., Physics*

Santa Barbara, CA

2003

## EXPERIENCE

**Stylus Labs***Founder*[styluslabs.com](http://styluslabs.com), [github.com/styluslabs](https://github.com/styluslabs)

2012–Present

- Created *Write*, an open-source application with unique functionality for organizing and editing handwritten documents. *Write* has been downloaded over 1 million times, covered by numerous publications including *The New York Times*, and bundled with the Nvidia Tegra Note 7 tablet.
- Created *Ascend Maps*, an open-source maps application supporting any combination of raster and vector layers, 3D terrain, track recording and editing, a unique plugin system, and more
- Developed and deployed real-time shared whiteboarding service for *Write*
- Created cross-platform (iOS, Android, Windows, Linux, Mac) bare-metal GUI application framework including OpenGL vector graphics renderer implementing several novel techniques for exact coverage antialiasing

**Independent Research in Computational Chemistry**[github.com/pbsurf/chem](https://github.com/pbsurf/chem)

2009–Present

Researched methods for computational modeling of enzyme catalysis for artificial photosynthesis and other applications. Developed open-source computational chemistry toolkit including QM/MM driver, transition state search, reaction path optimization, free energy methods, and interactive 3D visualization.

**Airbnb***Software Engineer*

San Francisco, CA and Singapore

2015–2017

- As a member of the Search team, built Java backend for numerous features including neighborhood display and facet counts
- Developed prototype of aggregated local guidebook, grew into winning hackathon project, and collaborated with cross-company team to release as major new feature

**Ooyala***Data Scientist*

Mountain View, CA

2011–2012

- Developed workflow and tools for extracting insights from terabyte-per-day data sources, utilizing Hadoop, Cassandra, and MySQL
- Gained experience with Scala, Storm, and Kafka while contributing to streaming data processing system

**Stanford Research Systems***Design Engineer*

Sunnyvale, CA

2010–2011

- Developed IP and firmware for FPGA system-on-chip digital signal processing system, including custom CIC downconverter, custom floating-point processor, and custom gigabit Ethernet MAC with checksum offload
- Completed design and layout of several mixed-signal circuits

**Dept. of Physics, University of Illinois***Graduate Researcher*

Urbana-Champaign, IL

2003–2009

First graduate student in first cold-atom research group at Illinois. The group rapidly built an apparatus for studying Bose-Einstein condensates in optical lattices.

- Designed, built, and debugged numerous analog, digital, and mixed-signal circuits, including low noise, high voltage, high current, and RF/microwave circuits
- Designed and built FPGA system-on-chip high-speed digital pattern generator

- Developed applications in C, C++, and MATLAB for controlling and monitoring apparatus, image analysis, and mathematical modeling
- Experience with ultra-high vacuum systems, metalworking, and 3D mechanical CAD
- Designed and built numerous free-space and fiber optic systems for precision spectroscopy, interferometry, imaging, and atom trapping

**Dept. of Chemical Engineering, U.C. Santa Barbara**

Santa Barbara, CA

*Undergraduate Research Assistant*

2001–2003

Developed methods for electrochemical fabrication of a new type of dye-sensitized photovoltaic device and characterized devices using AFM, SEM, and optical microscopy.

**IBM Storage Systems Division**

San Jose, CA

*Intern*

2000

Developed robotic system, including C++ control software, to measure air temperature and flow within hard disk drives using thermal anemometry.

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**TECHNICAL**

- C, C++, Python (advanced, 20+ years)
- Java, SQL, Javascript, Ruby, Lua, MATLAB
- Platforms: Android SDK and NDK; iOS/XCode; 3D, OpenGL; Qt framework; node.js; Rails
- Machine learning: Pytorch, Numpy/JAX; VAE, GAN, diffusion and flow models
- FPGA/Embedded: Verilog, VHDL; Modelsim, Xilinx ISE; FPGA DSP systems; firmware
- Analog and digital electronics: RF/microwave; low noise, high voltage, high current; PCB design
- Mechanical: 3D CAD (Autodesk Inventor); metalworking; ultra-high vacuum systems
- Optics and photonics: free-space and fiber optics; lasers; EO, AO, SLM devices

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**OPEN SOURCE**

- [styluslabs/Write](#): *Write* application (C++11/Java/Obj-C)
- [styluslabs/stylusboard](#): server for shared whiteboarding in *Write* (node.js)
- [styluslabs/maps](#): *Ascend Maps* application (C++14/Java/Obj-C/JS)
- [styluslabs/geodesk-tiles](#): map tile server with on-demand vector tile creation (C++20)
- [styluslabs/usvg](#): SVG object model library (C++11)
- [styluslabs/ugui](#): lightweight, cross-platform GUI framework built on usvg (C++11)
- [styluslabs/nanovgXC](#): OpenGL vector graphics renderer, based on nanovg (C, GLSL)
- [pbsurf/maps](#): 3D map engine, based on Tangram-ES (C++14)
- [pbsurf/chem](#): computational chemistry toolkit (Python)

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**PUBLICATIONS**

- D. Chen, M. White, C. Borries, and B. DeMarco. Quantum quench of an atomic Mott insulator. *Phys. Rev. Lett.* **106**, 235304 (2011).
- M. Pasienski, M. White, D. McKay, and B. DeMarco. A disordered insulator in an optical lattice, *Nature Physics* **6**, 677 (2010).
- D. McKay, M. White, and B. DeMarco. Lattice thermodynamics for ultra-cold atoms. *Phys. Rev. A* **79**, 063605 (2009).
- M. White, M. Pasienski, D. McKay, S. Zhou, D. Ceperley, and B. DeMarco. Strongly interacting bosons in a disordered optical lattice. *Phys. Rev. Lett.* **102**, 055301 (2009).
- D. McKay, M. White, M. Pasienski, and B. DeMarco. Phase-slip induced dissipation in an atomic Bose-Hubbard system. *Nature* **453**, 76 (2008).
- M. White, H. Gao, M. Pasienski, and B. DeMarco. Bose-Einstein condensates in RF-dressed adiabatic potentials. *Phys. Rev. A* **74**, 023616 (2006).
- J. Tang, M. White, G.D. Stucky, and E.W. McFarland. Electrochemical fabrication of large-area Au/TiO<sub>2</sub> junctions. *Electrochem. Commun.* **5**, 497 (2003).