

Brett Henderson

Curriculum Vitae

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Summary

I am a computational chemist interested in simulating nature with the best available computational technologies. My current research involves ab initio molecular dynamics simulations of solid-state materials and my passion is computational method development. My hope and vision is to help design the algorithms and software for studying the materials of the future.

Education

2013–2017	A.B. Engineering Sciences—Electrical and Computer Engineering (Cum Laude in Field), Secondary Computer Science	Harvard University
2019–present	Ph.D. Student in Chemistry	University of Victoria

Research Experience

2019–present **Ph.D. Student**, Paci Group University of Victoria

My research focus is simulating the dielectric response of nanocomposite materials both from first principles using density functional theory and through coarse-grained models based on classical electrostatics and the finite element method in MATLAB®.

2016–2017 **Research Assistant**, Vecitis Lab Harvard University

I fabricated reduced graphene oxide supercapacitors using a combination of bench-top and clean room techniques and helped characterize the devices using cyclic voltammetry and X-ray photoelectron spectroscopy.

Employment History

2017–2018 **Emerging Technologies Systems Engineer** The MITRE Corporation

I worked primarily as a python programmer and developed a tool leveraging optical character recognition and natural language processing to help automate quality assurance testing of captioned telephones. In another project, I helped build an extension of a Windows-based automated cybersecurity red-teaming software for use on Linux machines.

Honors and Awards

2021	1st Prize, Poster Contest, QSciTech-QuantumBC Virtual Workshop: Gate-based QC
2016, 2017	All-Academic Men's Track and Field Team, All-Academic Board of the National Collegiate Division 1 Track and Field Coaches Association
2017	Academic All-America Third Team, College Sports Information Directors of America
2015	Harvard College Scholarship Award
2014	John Harvard Award, Harvard College
2014	Detur Book Prize, Harvard College

Grants and Scholarships

2020–2021	Quantum Computing NSERC CREATE program scholarship	\$10,000
Dec. 2020	Mohamed and Prabha Ibrahim Graduate Scholarship in Chemistry	\$1,080
Aug. 2020	Graduate Award – Research Achievement, University of Victoria	\$1,367.33
2019–2020	Graduate Award – Academic Achievement, University of Victoria	\$1,500 biannually
2019	UVic Fellowship	\$10,000

Teaching

- 2021 **Teaching Assistant**, Chem477, Computational Chemistry
- 2020 **Teaching Assistant**, Chem 347, Quantum Chemistry
- 2020 **Laboratory Teaching Assistant**, Chem 260, Synthetic Chemistry Laboratory
- 2020 **Tutorial Instructor**, Chem 102, Chemical Reactivity Fundamentals with Environmental Applications
- 2019 **Laboratory Teaching Assistant**, Chem 150, Engineering Chemistry

Publications

Editorials

1. McFarlane, J., B. Henderson, S. Donnecke, and J. Scott McIndoe (2019a). An information-rich graphical representation of catalytic cycles. *Organometallics* **38**(21).

Public Lectures

1. Henderson, B. (Nov. 2020b). "Playing Dice With the Universe: Harnessing the Weird Behaviour of Quantum Bits to Solve Real World Problems". Nerd Nite Victoria.

Poster Presentations

1. Henderson, B., I. Benek-Lins, and M. Mathews (Feb. 2021). "H2 ground state finder using Qiskit". QSciTech-QuantumBC Virtual Workshop: Gate-based Quantum Computing Using IBM Q.
2. Henderson, B. (Nov. 2020a). "Coarse-Grained Modeling of nanoComposite Dielectrics". University of Victoria dept. of chemistry graduate student research day poster session.
3. Henderson, B., A. Adluri, and I. Paci (Mar. 2020). "Multi-scale modeling of polarization in metal oxide nanocomposites". University of Victoria Ideafest - getting up to speed with nature's imagination.
4. Henderson, B., A. Adluri, and I. Paci (Nov. 2019). "Multi-scale modeling of polarization in metal oxide nanocomposites". University of Victoria dept. of chemistry graduate student research day poster session.
5. McFarlane, J., B. Henderson, S. Donnecke, and J. Scott McIndoe (May 2019b). "An information-rich graphical representation of catalytic cycles". Inorganic Discussion Weekend, University of Victoria.

Software

These software projects are on display at brettrhenderson.github.io

1. Henderson, B. (2020c). "pybec". Extract and manipulate born effective charges from QuantumEspresso output files. <https://github.com/brettrhenderson/pybec>.
2. Henderson, B. (2020d). "pyFractals". Animation of sierpinski triangle construction via binary tree method. <https://github.com/brettrhenderson/pyFractals>.
3. Henderson, B. (2020e). "PySims". A collection of classical mechanics simulations using python. <https://github.com/brettrhenderson/PySims>.
4. Henderson, B., J. MacFarlane, and S. Donnecke (2019). "Catacycle". An information-rich graphical representation of catalytic cycles. <https://github.com/brettrhenderson/Catacycle>.
5. Sun, A., N. Cable, and B. Henderson (2013). "Pacman: revenge of blinky". CS50 final project. <https://github.com/brettrhenderson/pacboi>.