

Samuel J. Dawley

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Education

Princeton University

PH.D. in CHEMISTRY

Princeton, NJ

Fall 2023 - Present

Johns Hopkins University

B.A. in CHEMISTRY, APPLIED MATHEMATICS AND STATISTICS

Baltimore, MD

Fall 2019 - Spring 2023

Research

Platform for the Accelerated Realization, Analysis, and Discovery of Interface Materials

Baltimore, MD

RESEARCH INTERN | Advised by Dr. David Elbert, Dr. Tyrel McQueen, and Dr. Apurva Mehta

Summer 2022

- Advanced strategies for real-time data analysis toward achieving autonomous experimental control.
- Used statistical analysis and machine learning to develop an algorithm and programmatic implementation for automatic signal structure and spectral peak detection.
- Gained experience in inorganic synthesis and characterization using X-ray diffraction.
- Implemented methods for live streaming experimental data using Apache Kafka.

Massachusetts General Hospital

Boston, MA

RESEARCH INTERN | Advised by Dr. Tristan Kooistra and Dr. Benjamin Medoff

Summer 2021

- Studied response of airway epithelium cells to lung inflammation and scarring for an increased understanding of idiopathic pulmonary fibrosis.
- Created, maintained, and monitored tissue cocultures grown from basal and immune cells of a murine sample.
- Developed algorithm to parse the spatial distribution of cultured cells using a Delaunay triangulation and visualize the inflammation patterning.

Department of Chemistry, Johns Hopkins University

Baltimore, MD

UNDERGRADUATE RESEARCH ASSISTANT | Advised by Dr. Lan Cheng

Spring 2022 - Spring 2023

- Researched relativistic effects in light- and heavy-atom molecules using high-level computational and theoretical methods aimed at quantitative descriptions of quantum systems.
- Used coupled-cluster theory to calculate lifetimes and polarizabilities of laser-cooled molecular and heavy-element ionic diatoms.
- Presented benchmark calculations and assessed relative efficacy of perturbative and variational treatments of spin-orbit coupling in heavy-element molecules.
- Collaborated with experimentalists to corroborate results at ultracold temperatures.

UNDERGRADUATE RESEARCH ASSISTANT | Advised by Dr. John Dayton Tovar

Winter 2020 - Present

- Studied non-planar, hybrid radial and linear aromatic systems containing cycloparaphenylenes and their derivatives.
- Synthesized novel organic compounds for cycloparaphenylene modeling and characterized materials using NMR and mass spectrometry.
- Computed optimized geometries and molecular orbital energies of cycloparaphenylenes with density functional theory using high-power computing clusters.
- Configured Python package to work with advanced computing clusters and updated for running with Gaussian16 to calculate nucleus independent chemical shifts of aromatic molecules.
- Developed program to automate optimized geometry calculations in Gaussian with the Maryland Advanced Research and Computing Center.

Teaching

Johns Hopkins University

Baltimore, MD

UNDERGRADUATE TEACHING ASSISTANT | Department of Applied Mathematics and Statistics

Spring 2023

(553.450/650) Computational Molecular Medicine Instructed on methods in machine learning, statistical inference, and multiple hypothesis testing for analyzing high-dimensional data as they apply to modern computational systems biology.

UNDERGRADUATE TEACHING ASSISTANT | Department of Chemistry

Spring 2022 - Summer 2023

(030.205, 030.206) Organic Chemistry I & II Instructed students on fundamental organic reactions and their mechanisms in addition to describing the underlying molecular orbital theory supporting such phenomena.

(030.228) Intermediate Organic Chemistry Laboratory Expanded on introductory methods in organic synthesis and characterization while edifying students on how to independently develop and test hypotheses.

(030.227) Introductory Organic Chemistry Laboratory Taught and motivated rudimentary techniques in organic synthesis while facilitating the use of basic instrumentation such as NMR, IR, and UV/Vis spectroscopy, mass spectrometry, and gas chromatography.

PEER TUTOR | Office of Academic Advising

Fall 2020 - Spring 2023

Head PILOT Leader Organized and led weekly meetings for teaching students multivariate calculus and organic chemistry; responsible for creating problem sets and answer keys in collaboration with course instructor used by all students within the class; facilitated review sessions for midterm and final exams.

Private Tutor Worked individually with undergraduate students to tutor in linear algebra, multivariate calculus, organic chemistry, and physical chemistry.

Tutorial Project Volunteered with Baltimore public elementary school students for individualized tutoring in math, reading, and writing; worked collaboratively with parents of tutees to ensure personalized support.

Publications & Presentations

PUBLICATIONS

1. N. B. Vilas; C. Hallas; L. Anderegg; P. Robichaud; C. Zhang; **S. Dawley**; L. Cheng; J. M. Doyle. Blackbody thermalization and vibrational lifetimes of trapped polyatomic molecules. *Phys. Rev. A* **107**, 062802 (2023).

PRESENTATIONS

2. **S. Dawley**, C. Zhang, X. Zheng, and L. Cheng. "Blackbody Thermalization and Vibrational Lifetimes of Trapped Polyatomic Molecules." Presented at the National Meeting of the ACS, Indianapolis, IN, 2023.
1. **S. Dawley**, D. Elbert, T. McQueen, and A. Mehta. "Streaming by Design for Materials Characterization." Presented at Cornell University, Ithaca, NY, 2022.

Honors

2023 **American Chemical Society Undergraduate Award**

2023 **Departmental Honors in Chemistry**

Leadership

Best Buddies International

Various · Spring 2019 - Present

- Volunteered with people with intellectual and developmental disabilities in a variety of community events.
- Raised money for organization through events including fundraising auctions, road races, and bike rides.

Chemistry Student Safety Committee

Baltimore, MD · Fall 2021 - Present

- Addressed safety hazards across departmental facilities and individual labs.
- Attended trainings for development of proper scientific lab safety, management, and conduct.

First-Year Mentor

Baltimore, MD · Summer 2020 - Spring 2021

- Supported incoming Hopkins students with year-round peer-to-peer support to ensure successful transition between high school and college; responsible for orienting and mentoring a cohort of new students during their first year.

Best Buddies Club

Baltimore, MD · Fall 2019 - Present

- Traveled to and spent time with students at Claremont School in Baltimore which specializes in providing educational services to students with moderate to profound intellectual and developmental disabilities; involved in transporting the team of student volunteers each week.
- Promoted friendships among Claremont and Hopkins students through activities including sports, arts and crafts, and gardening.

Exceptional Citizens' Week at Camp Fatima

- Volunteered at week-long camp for people with intellectual and developmental disabilities.
- Worked one-on-one with person with disability and provided individualized support for sleeping, eating, bathing, and playing around the camp.
- Member of team which organized and served meals for entire camp and prepared camp grounds for activities including arts and crafts, fairs, parades, and theater productions.
- Raised money for Camp during other parts of the year through community events and outreach.

Skills & Tools

Experienced C/C++, Gaussian, Git, \LaTeX , Mathematica, Python

Basic CFOUR (Coupled-Cluster techniques for Computational Chemistry), MATLAB