Shannon M. Bernier

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Education

Doctor of Philosophy

Johns Hopkins University – Baltimore, MD *(Aug. 2025)*

- Major field of study: Chemistry
- Advisor: Tyrel M. McQueen

Master of Arts

Johns Hopkins University – Baltimore, MD *(Aug. 2021)*

- Major field of study: Chemistry
- Relevant courses: Responsible Conduct of Research, Optoelectronic Materials & Devices, Materials Synthesis, Materials & Surface Characterization, Condensed Matter Physics Theory, Experimental Condensed Matter, Quantum Field Theory I and II, Quantum Chemistry, Computational Chemistry, Group Theory, Statistical Mechanics, Complex Analysis, and Differential Geometry.

Bachelor of the Arts

McDaniel College – Westminster, MD *(May 2019)*

- Majors in Physics and Chemistry with a minor in Mathematics.
- Member of the college Honors Program, Phi Beta Kappa, KME Mathematics honors society, ΓΣΕ Chemistry honors society, and ΣΠΣ Physics honors society.
- GPA: 3.74
- Relevant courses: Organic Chemistry I and II, Physical Chemistry I and II, Analytical Chemistry, Inorganic Chemistry, Mathematical Physics, Electricity & Magnetism, Thermodynamics, Quantum Mechanics, Calculus II and III, Linear Algebra, Differential Equations, and Probability.

Research Experience

Graduate Research Assistant

McQueen Lab, Johns Hopkins University – Baltimore, MD *(Nov. 2019 – present)*

- Advisor: Tyrel M. McQueen
- Synthesis and characterization of doped Ising-like $A_2B_2O_6O'$ rare earth pyrochlores for comparison to quantum annealer simulations.

- Experience with solid state and floating zone growth techniques, powder and single-crystalline x-ray analysis, and instrument interface design with LabView.

Summer Undergraduate Research Fellowship

Materials Measurement Laboratory, National Institute of Standards and Technology – Gaithersburg, MD *(May - Aug. 2018)*

- Advisors: Cary Presser and Ashot Nazarian
- Research on development of thermochemical analysis method for biofuel blends using a device called the laser-driven thermal reactor.
- Designed automated Excel spreadsheets to process and analyze data, prepared reactor spheres, and ran experiments using the LabView data acquisition system.
- Received formal lab safety and laser safety training.

Summer Physics REU

McDaniel College – Westminster, MD *(June – July 2017)*

- Advisor: Vasilis Pagonis
- Executed Monte Carlo modelling of electron tunneling in geological material and its effect on thermoluminescence rates.
- Developed and ran simulation code and graphed collected data using Mathematica, NetLogo, and SigmaPlot.

Publications

- "A Crystallographic Metric for Continuous Quantification of Unit Cell Deformation" by Bernier et. al. *Submitted to Journal of Applied Crystallography* **2025**. ArXiV: 2508.01177
- "Symmetry-mediated quantum coherence of W^{5+} spins in an oxygen-deficient double perovskite" by Bernier et. al. *npj Quantum Materials,* **2025** DOI: 10.1038/s41535-025-00782-3
- "Random-exchange Heisenberg behavior in the electron-doped quasi-one-dimensional spin-1 chain compound $AgVP_2S_6$" by Orban et. al. *Phys. Rev. B.* **2024** DOI: 10.1103/PhysRevB.110.054423
- "Disordered Layers and Dimerization in the Crystal Structure of $TaOCl_2$" by Ng et. al. *J. Solid State Chem.,* **2024**. DOI: 10.1016/j.jssc.2024.124771
- "Tunable W^{5+} Absorbance in Laser Floating Zone Grown Bismuth Tungstate" by Pressley et. al. *J. Phys. Chem C.*, **2023**. DOI: 10.1021/acs.jpcc.3c04645
- "Laser floating zone growth of $SrVO_3$ single crystals" by Berry et. al. *Journal of Crystal Growth*, **2022**. DOI: 10.1016/j.jcrysgro.2022.126518
- "Laser-Driven Calorimetry and Chemometric Quantification of Standard Reference Material Diesel/Biodiesel Fuel Blends" by Presser et. al., *Fuel*, **2020**. DOI: 10.1016/j.fuel.2020.118720

- "The effect of crystal size on tunneling phenomena in luminescent nanodosimetric materials" by Pagonis et. al., *Nuc. Inst. & Methods B*, **2017**. DOI: 10.1016/j.nimb.2017.09.016

Presentations

Materials Research Society Spring Meeting

Seattle, WA *(Apr. 2025)*

- Poster presentation entitled "$Yb_2T_2O_7$: An illustration of the need for multi-modal characterization in the synthesis of quantum materials"

National QIS Research Centers All PI Meeting

Rockville, MD *(Sept. 2024)*

- Poster presentation entitled "Advancing QISE with Materials Science"

Aspen Center for Physics Conference: Quantum Materials in the Quantum Information Era: From Theory to Experiment

Aspen, CO *(Feb. 2024)*

- Poster presentation entitled "Understanding material-specific sources of quantum decoherence"

Co-Design Center for Quantum Advantage All-Hands Meeting

New Haven, CT *(Oct. 2022)*

- Poster presentation entitled "Understanding sources of quantum decoherence in oxygen deficient double perovskites"

Northeast Regional Honors Council Annual Conference: Generating Power

Baltimore, MD *(Apr. 2019)*

- Oral presentation of "Analyzing the Energy Content of Biofuel Blends Using the LDTR"
- Won Best Presentation in the Alternative Energy category.

Maryland Collegiate Honors Conference: Conflict and Resolution

Morgan State University – Baltimore, MD *(Mar. 2019)*

- Presented poster entitled "Thermochemical Analysis of Fuel Blends Using the LDTR" based on summer 2018 work at NIST.
- Won Best Poster Presentation.

UMBC Undergraduate Research Conference in the Chemical & Biological Sciences

University of Maryland Baltimore County – Baltimore, MD *(Oct. 2018)*

- Presented "Thermochemical Analysis of Fuel Blends Using the LDTR" poster.

Maryland Collegiate Honors Conference: Taking Action

Frostburg State University – Frostburg, MD *(Mar. 2018)*

- Presented poster entitled "Designing Gas-Storing Metal-Organic Frameworks to Address Environmental Change" based on literature review of current MOF research.

Honors and Awards

- Recipient of the Maryland State Arts Council Folklife Apprenticeship Grant with Linda Van Hart of Toll House Studio *(July 2022)*
- Krieger School of Arts & Sciences Excellence in Teaching Award nominee *(Apr. 2020)*
- Recipient of the Harry Clary Jones Scholarship for excellence in Chemistry *(May 2018)*

Teaching & Teacher Training

Johns Hopkins University Teaching Academy Certificate of Completion

Johns Hopkins University – Baltimore, MD *(Dec 2022)*

- Relevant coursework: JHU 3-day Teaching Institute, CIRTL "An Introduction to Evidence-Based Undergraduate STEM Teaching", CIRTL "Introduction to Teaching at a Community College", CIRTL "Incorporating Scientific Communication into STEM Courses".
- Independent teaching requirement satisfied by teaching 10-hour module on LabVIEW to Data Science Tools for the Chemical and Materials Sciences. Mentored by Tyrel McQueen.

PARADIM REU mentor

PARADIM Bulk Crystal Growth Facility, Johns Hopkins University – Baltimore, MD *(June 2020 - Jan. 2021)*

- Guided undergraduate student through a project to automate a Laue x-ray diffractometer-based crystal alignment system.

Gymnastics Instructor

Frederick Gymnastics Club – Frederick, MD *(Nov. 2014 – Present)*

- Design and implement curricula, give safety lectures, and work as substitute instructor for recreational gymnastics and tumbling. Specialize in boys' and girls' tumbling, ages 6-18.
- USAG certified Recreational Coach. SafeSport trained.
- Adult & Pediatric CPR certified by the American Heart Association *(Oct. 2024)*

Physical Chemistry Lab Teaching Assistant

Johns Hopkins University – Baltimore, MD *(Sept. 2019 – Dec. 2021)*

- Responsible for operating 1-2 experiments per semester including maintenance of equipment, teaching students, safety monitoring, rubric design, and grading. One semester of this course was taught virtually.

Introductory Chemistry II Head Teaching Assistant

Johns Hopkins University – Baltimore, MD *(Jan. – June 2021)*

- Responsible for exam design, general course logistics, organization of TAs and review material, and communication with students. This course was taught virtually.
- Experience uploading and formatting course materials (including exams and multimedia files) on Blackboard, Gradescope, Canvas, and Sapling.

Chemistry Laboratory Teaching Assistant

McDaniel College – Westminster, MD *(Sept. 2017 – May 2019)*

- Teaching assistant for individual semesters of Physical Chemistry, Biochemistry I, and Introductory Chemistry labs. Advisors: Melanie Nilsson and Stephanie Bettis-Homan.
- Prepare lab materials and equipment and ensure experiments run smoothly. Assist with exam proctoring and safety monitoring.

Volunteer Experience

Chemistry Student Safety Committee

Johns Hopkins University – Baltimore, MD *(May 2022 – May 2024)*

- Instrumental in organizing first and second annual departmental Safety Days and implementing new labcoat laundering program for the Chemistry Department.
- Vice Chair September 2022 – September 2023

Volunteer Event Proctor

Maryland Science Olympiad *(November 2015 – Present)*

- Give safety lectures and write, proctor, and grade exams for middle- and high school-level competitions across Maryland.

Other Skills and Interests

- Much experience working in R, the Wolfram Language, and LabVIEW. Some experience with Java, LaTeX, NetLogo, Python, and various HTML-derived languages.
- Proficient in the use of Microsoft Windows (Windows 95 through Windows 10) and Microsoft Office suite of programs (versions 2003 – 2016/Office 365).
- Moderate level of reading comprehension in Spanish, some basic speaking skills.
- Owner/operator of Group 11 Metalsmithing. Comfortable working safely with hand/power tools and oxy-acetylene torches.

- 19 years' saxophone playing. Founder and baritone saxophonist of McDaniel College's G4 Quartet. Performed at the International Saxophone Symposium, Fairfax, VA *(Jan. 2019)*.