

Shannon M. Bernier Curriculum Vitae

<https://shannon-bernier.github.io>

Address/Contact info: by request

Education

Doctor of Philosophy

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

- Major field of study: Chemistry
- Advisor: Tyrel M. McQueen
- Thesis: “A Systematic Investigation of Defects in Quantum Materials” (expected [online publication](#) date December 2025)

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. GPA: 3.74
- Member of the college Honors Program, Phi Beta Kappa, KME Mathematics honors society, ΓΣΕ Chemistry honors society, and ΣΠΣ Physics honors society.
- 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 – Aug. 2025*)

- Advisor: Tyrel M. McQueen
- Main project on synthesis and characterization of doped Ising-like $A_2B_2O_6$ rare earth pyrochlores for comparison to quantum annealer simulations. Additional project on identifying and quantifying defects in spin-qubit candidate host materials Ba/Sr_2CaWO_6 .

- Experience with solid state and floating zone growth techniques, powder and single-crystalline x-ray analysis, thermal and physical properties analysis, infrared spectroscopy, instrument repair, and instrument communication using 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
- Project to develop a thermochemical analysis method for biofuel blends using a device called the laser-driven thermal reactor and machine learning chemometric techniques.
- Designed automated Excel spreadsheets to process data, assisted with training and testing of machine learning models, and ran experiments using the LabVIEW data acquisition system.

Summer Physics REU

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

- Advisor: Vasilis Pagonis
- Project using Monte Carlo modelling to predict electron tunneling in geological material and its effect on thermoluminescence rates, with applications to higher-accuracy archaeological dating techniques.
- Developed simulation code and analyzed data using Mathematica, NetLogo, and SigmaPlot.

Publications

- “Order-Disorder Transitions In Yb₂Ti₂O₇ and Their Effects on Material Color”, by Bernier et. al. In Preparation, **2025**.
- “A Crystallographic Metric for Continuous Quantification of Unit Cell Deformation” by Bernier et. al. Submitted to *Journal of Applied Crystallography* **2025**. ArXiv: [2508.01177](https://arxiv.org/abs/2508.01177)
- “Symmetry-mediated quantum coherence of W⁵⁺ spins in an oxygen-deficient double perovskite” by Bernier et. al. *npj Quantum Materials*, **2025** DOI: [10.1038/s41535-025-00782-3](https://doi.org/10.1038/s41535-025-00782-3)
- “Random-exchange Heisenberg behavior in the electron-doped quasi-one-dimensional spin-1 chain compound AgVP₂S₆” by Orban et. al. *Phys. Rev. B*. **2024** DOI: [10.1103/PhysRevB.110.054423](https://doi.org/10.1103/PhysRevB.110.054423)
- “Disordered Layers and Dimerization in the Crystal Structure of TaOCl₂” by Ng et. al. *J. Solid State Chem.*, **2024**. DOI: [10.1016/j.jssc.2024.124771](https://doi.org/10.1016/j.jssc.2024.124771)
- “Tunable W⁵⁺ Absorbance in Laser Floating Zone Grown Bismuth Tungstate” by Pressley et. al. *J. Phys. Chem C.*, **2023**. DOI: [10.1021/acs.jpcc.3c04645](https://doi.org/10.1021/acs.jpcc.3c04645)
- “Laser floating zone growth of SrVO₃ single crystals” by Berry et. al. *Journal of Crystal Growth*, **2022**. DOI: [10.1016/j.jcrysgro.2022.126518](https://doi.org/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](https://doi.org/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](https://doi.org/10.1016/j.nimb.2017.09.016)

Presentations

- Poster, Materials Research Society Spring Meeting (*Apr. 2025*)
- Poster, National QIS Research Centers All PI Meeting (*Sept. 2024*)
- Poster, Aspen Center for Physics Conference: Quantum Materials in the Quantum Information Era: From Theory to Experiment (*Feb. 2024*)
- Poster, Co-Design Center for Quantum Advantage All-Hands Meeting (*Oct. 2022*)
- Oral presentation, Northeast Regional Honors Council Annual Conference: Generating Power (*Apr. 2019*). Awarded "Best Presentation in the Alternative Energy category".
- Poster, Maryland Collegiate Honors Conference: Conflict and Resolution (*Mar. 2019*). Awarded "Best Poster".
- Poster, UMBC Undergraduate Research Conference in the Chemical & Biological Sciences (*Oct. 2018*)
- Poster, Maryland Collegiate Honors Conference: Taking Action (*Mar. 2018*)

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 using LabVIEW.

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, instruction, safety monitoring, rubric design, and grading. One semester of this course was taught virtually. Advisors: Art Bragg, Thomas Kempa, and Howard Fairbrother.

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. Advisor: Ken Karlin.
- 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 Sept. 2022 – Sept. 2023

Volunteer Event Proctor

Maryland Science Olympiad (*Nov. 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.
- Basic machine shop and welding training.
- 19 years' saxophone experience. Founder and baritone saxophonist of McDaniel College's G4 Quartet. Performed at the International Saxophone Symposium, Fairfax, VA (*Jan. 2019*)