David Beckwitt, Ph.D.

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Ph.D. Candidate Physicist specializing in quantitative modeling and machine learning analysis of structural defects in van der Waals materials.

Education

May 2026 **University of Missouri, Columbia, MO — Ph.D. in Physics**

- Dissertation: *Investigating Disorder in van der Waals Thin Films*
- Advisor: Dr. Paul Miceli

May 2022 **University of Missouri, Columbia, MO — M.S. in Physics**

May 2020 **Missouri State University, Springfield, MO - B.S.in Physics**

Minor: Mathematics, Chemistry

Research Experience

2021–Present **Graduate Research Assistant** , University of Missouri

- Developed **Python**-based quantitative Grazing Incident Wide Angle Xray Scattering (GIWAXS) **simulations** with **Reverse Monte Carlo** methods to extract occupancies, anisotropic Debye–Waller factors, mosaicity, and experimental geometry.
- Extended GIWAXS to **model diffuse scattering from stacking faults** to quantify defect densities.
- Grew controlled-phase PbI_2 thin films via **Chemical Vapor Deposition** (CVD); validated simulated polytype fractions experimentally.
- Implemented **CNNs** trained on simulated GIWAXS data using **PyTorch** for automated structural analysis of van der Waals thin films.

2019–2020 **Research Intern**, NASA Space Consortium

- Synthesized graphene films via **pulsed laser deposition** (PLD) and **pulsed vapor deposition** (PVD); characterized via **Raman spectroscopy** and **electron microscopy**.

2017–2020 **Research Assistant**, Missouri State University; Advisors: Dr. Kartik Ghosh, Dr. Saibal Mitra

- Designed, built, and operated PLD system; characterized thin films via XRD, Raman, SEM/EDS, and profilometry.

2019 **R&D Intern**, Dynatek Labs

- Developed software for biomedical testing and automated hardware systems.

Technical Skills

Programming	**Python** (7 years), Fortran, C++, R, Git, MPI, Bash scripting, LaTeX, SQL, **Excel**, **Visual Basic Advanced**
Data Analysis	Monte Carlo methods, Machine Learning (**PyTorch**, TensorFlow), **NumPy**, pandas, SciPy
Data Visualization	**Matplotlib**, **Plotly**, OriginLab, MATLAB, Jupyter Notebooks, Dash
Instrumentation	**X-ray/neutron scattering**, Chemical Vapor Deposition (CVD), Pulsed Laser Deposition (PLD), Scanning Electron Microscopy (SEM), Raman spectroscopy
Communication	**Technical writing**, Video and Animation creation/editing, Grant proposal development, Peer-review process

Research Publications

Journal Articles

- C. J. Arendse, R. Burns, **D. Beckwitt**, *et al.*, "Insights into the Growth Orientation and Phase Stability of Chemical-Vapor-Deposited Two-Dimensional Hybrid Halide Perovskite Films," *ACS Applied Materials & Interfaces*, vol. 15, no. 50, pp. 56 692–56 703, Dec. 2023. DOI: 10.1021/acsami.3c14559.

In Review / In Preparation

- **D. Beckwitt** *et al.*, "Simulation-Guided Control of Polytypism in CVD-Grown PbI_2," In Preparation—Anticipated Spring 2026, 2026.
- **D. Beckwitt** *et al.*, "Supervised Convolutional Neural Networks Trained on Simulated GIWAXS Patterns for Structural Analysis of Thin Films," In Preparation—Anticipated Spring 2026, 2026.
- **D. Beckwitt** *et al.*, "Quantitative Modeling of Grazing-Incidence Wide-Angle X-Ray Scattering Patterns from Van der Waals Thin Films," In Review—Anticipated Summer 2025, 2025.
- **D. Beckwitt** *et al.*, "Quantitative Simulation of Stacking Faults and Structural Disorder in CVD-Grown PbI_2 Thin Films," In Review—Anticipated Fall 2025, 2025.

Conference Proceedings

- **D. Beckwitt**, "X-Ray Diffraction Investigation of Disorder in Van der Waals Thin Films," in *APS March Meeting, ACNS, and MSU Seminar (3 Talks)*, Presented at APS Prairie Section 2023 and at multiple venues in 2024, 2024.
- **D. Beckwitt**, "Fabrication and Characterization of 2D Heterostructure of Graphene and Transition-Metal Oxides," Missouri State University, 2020.
- **D. Beckwitt**, "Development of a Sol-Gel TiO_2 Buffer Layer for Perovskite Solar Cell Applications," in *Einhellig Interdisciplinary Forum*, Springfield, MO, 2018.
- **D. Beckwitt**, "Investigation of Solid-State LiPON Thin Films Grown by Pulsed Laser Deposition for Application as an Electrolyte," in *Arkansas INBRE Poster Presentation*, University of Arkansas, Oct. 2018.
- **D. Beckwitt**, "Synthesis of PbO_2 Thin Films for Perovskite CH_3PbX_3-Based Solar Cell," in *Einhellig Interdisciplinary Forum*, Springfield, MO, 2017.

Teaching Experience

2018–2023 **Instructor and Teaching Assistant**, University of Missouri and Missouri State University Student Reviews

- Calculus-based Mechanics, Electricity & Magnetism, and Introductory C++ Programming

2021–Present **Academic Tutor**, Physics Courses, University of Missouri, Columbia, MO

2018–2021 **ACT Prep Tutor**, Club Z!, Springfield, MO

2014–2020 **Martial Arts Coach**, Dunham's Martial Arts, Springfield, MO

Leadership, Service & Outreach

Outreach and Service

2023–2024 **Vice-President, Physics and Astronomy Graduate Student Association (PAGSA)**, University of Missouri.

2022–2024 **Director, PAGSA Mental Health Wellness Program**, University of Missouri.

Research Outreach, University of Missouri.

2022–2023 **President, Physics and Astronomy Graduate Student Association (PAGSA)**, University of Missouri.

Coalition of Graduate Workers Diversity Officer, University of Missouri.

2022 ΣΠΣ **Physics Congress – Presentation/Poster Judge**, Washington, DC.

2018–2019 **College of Natural and Applied Sciences Leadership Board**, Missouri State University.

2017–2020 **SPS High School Engagement**, Missouri State University.

Awards

2023 **Outstanding Student Research Presentation**, Neutron Scattering Society.

Excellence in Physics Fergason Scholarship, University of Missouri.

Green Chalk Teaching Award, University of Missouri.

Rangel-Boain Travel Award, University of Missouri.

2022 **Newell S. Gingrich Physics Scholarship**, University of Missouri.

Excellence in Student Leadership, Graduate Professional Council, University of Missouri.

Excellence in Undergraduate Teaching, University of Missouri.

2021 **O.M. Stewart Scholarship**, University of Missouri.