Jared Keith Averitt

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Education

University North Carolina in Greensboro — Greensboro, NC
Ph.D., Material Science. GPA 3.96/4.0 — Aug 15 2020 - May 3 2024
Additional Physics Coursework at Duke University.
Dissertation Title : *Modeling the Dynamics of 2D Nanoscale Devices:*
From Classical Physics to Quantum Theory and Machine Learning Perspectives.

Austin Peay State University — Clarksville, TN
B.S., Physics Major and Mathematics Minor. GPA 3.93/4.0 — Jan 6 2018 - May 5 2020

Austin Peay State University — Clarksville, TN
B.S., Biology Major and Chemistry Minor. GPA 3.38/4.0 — Aug 23 2008 - May 5 2020

Skills & Interests

Modeling: Machine Learned Interatomic Potentials (HIPNN, ANIKIN), Finite Element (MOOSE, COMSOL), Physics (fluid dynamics, classical/quantum/statistical-mechanics, electricity and magnetism), Numerical Methods (FDM, FEA, PDE coupling, spectral analysis, Monte Carlo)

Computational: High Performance Computing (openMPI, CUDA, GPU), Mac OS, Linux and Windows

Molecular Simulations: Density Functional Theory (VASP, Gaussian16), Molecular Dynamics (ReaxFF, SDF), Analysis Tools (PyMol,VMD, Chemcraft, ASE, Multiwfn)

Machine Learning: Designing algorithms (GCN, CNN, MLP), Development (PyTorch, Scikit-learn)

Coding: Fortran, C++, Python, MATLAB, Mathematica, LaTeX, TiKz

Interests: Writing, Graphics Design, Woodworking, Backwoods camping

Research Experience

Los Alamos National Laboratory — Los Alamos, NM
Postdoc — June 16 2024 – Present
- Mentored by Dr. Ben Nebgen, Dr. Barros and Dr. Sergei Tretiak within the Theoretical Division's Physics and Chemistry of Materials Group.
- Building Machine Learned Interatomic Models (MLIAPs) using methods such as HIPPNN.

The Pennsylvania State University — State College, PA
Visiting Computational Research Scholar — May 4 2023 – Present
- Mentored by Drs. Vincent Crespi, Adri van Duin, and Weiss Reinhart within the NSF-funded Two-Dimensional Crystal Consortium – Materials Innovation Platform, Theory Group.
- Completed training on DFT using VASP for 2D material surface interactions.
- Innovated SurfSense, a graphing convolutional network adept at predicting energy shifts from compositional changes.
- Conducted reactive force-field (ReaxFF) simulations to elucidate polymer adhesion behavior on defective graphene surfaces, contributing to improved material interfaces.
- Disseminated findings through 3 poster presentations; currently finalizing a manuscript.

DEVCOM Soldier Center — Remote
Graduate Student Scholar — Jan 9 2022 - Present

- Collaborated with Drs. Micheal Ghebrebrhan and Joseph Palomba under the partnership between the US Department of Defense Army DEVCOM Soldier Center and The Joint School of Nanoscience and Nanoengineering (Contract W911QY2220006).
- Engaged with scientists, soldiers, and veterans to develop digital twins of chemical sensors for extreme environments, enhancing soldier safety.
- Led project on the electronic structure modulation of Pyrene-graphene based chemical sensors.
- Disseminated findings through 2 poster presentations; currently finalizing a manuscript slated for submission in April 2024.

University of North Carolina in Greensboro Greensboro, NC
NSF Graduate Research Fellow Jan 5 2020 - Present
- Mentored by Drs. Tetyana Ignatova and Joseph Starobin, Joint School of Nanoscience and Nanoengineering (JSNN), a member of the National Nanotechnology Coordinated Infrastructure (NNCI), which is supported by the National Science Foundation (Grant ECCS-2025462).
- Delved into the study of water's electrostatic potential shielding across varied environments, utilizing the Finite Element Method with MOOSE and COMSOL.
- Spearheaded the creation of innovative computational techniques for nano-scale analysis, integrating Neural Networks and Density Functional Theory (DFT).
- Led project to optimize solid-state optoelectronic sensor designs and quantify polymer adhesion energies, enhancing graphene transfer methods.
- Disseminated findings through 7 poster presentations; 1 manuscript in peer-review, 2 in preparation.

Austin Peay State University, Department of Physics and Engineering Clarksville, TN
Undergraduate Research Assistant Aug 7 2018 – May 5 2020
- Under the guidance of Drs. Roman Holovchak and Andriy Kovalskiy, engaged in interdisciplinary collaboration with the Physics and Geology departments to analyze water inclusions in quartz using Positron Annihilation Lifetime Spectroscopy (PALS).
- Developed a precision device for radioactive positron deposition on thin films, alongside a 3D-printed tool for source positioning, enhancing the accuracy of PALS data analysis.
- Synthesized and presented research findings in three posters, showcasing advancements in the application of PALS for material analysis.

Austin Peay State University, Department of Biology Clarksville, TN
Undergraduate Research Assistant Aug 10 2018 – May 5 2020
- Under the guidance of Dr. Sergei Markov in the Bioreactor Lab. Jan 2011 – May 2013
- Supervised and trained three researchers, enhancing team proficiency and research output in biofuel production.
- Optimized bioreactor conditions, increasing biofuel production efficiency through process adjustments.
- Conducted comprehensive chemical analyses, collecting data to inform ongoing research and development efforts.
- Co-authored a peer-reviewed article, contributing insights to the scientific community's understanding of lab scale to industry scale bioreactor technologies.
- Disseminated research findings through four posters and an oral presentation, sharing advancements in biofuel production methodologies.

Teaching Experience

Governor's School for Computational Physics, Austin Peay State University. Clarksville, TN
Teaching Assistant and Resident Mentor Jun 2 2019 – Jul 19 2020
- Under mentorship of *Dr. Alex King, Director, Tennessee Governor's School for Computational Physics*
- This 3-week summer program was funded by the Tennessee Department of Education and is designed to give high-school students a challenging college experience in numerical modeling of physics and engineering problems.
- Responsibilities included living in the dorms with the students and supporting class and laboratory activities — this included helping students with their homework assignments and computer code.
- Feedback from Director: "I observed Jared to be a particularly patient and thoughtful mentor – always nudging students in the right direction by asking them questions without judgement for their mis-steps (a particular challenge in 2020 when the program was forced to go remote)."

Tri-County (TRIO) Upward Bound, Austin Peay State University. Clarksville, TN
Physics and Mathematics Instructor Aug 7 2019 – Jul 29 2020
- Collaborated with *Upward Bound director, Ms. Melissa Conwell*
- For APSU's federally funded Upward Bound program which targets potential first-generation college students while they are still in high-school.
- Designed and implemented engaging lesson plans for a 5-week pre-college preparatory program, while maintaining academic records.
- Coordinated with the APSU Physics Department to secure resources for the program as those provided to college students, ensuring access to these resources for future cohorts.

Department of Physics and Engineering, Austin Peay State University. Clarksville, TN
Teaching Assistant Jun 11 2019 – Jul 23 2020
- Led bi-weekly recitations and worked closely with faculty to strengthen student-professor relationships, facilitating discussions to identify learning gaps. This experience exposed me to diverse teaching methods and enhanced my understanding of student learning needs, helping them grasp course material and succeed academically.
- Supported courses and instructors include:
    - Calculus-based Physics for *Dr. Roman Holovchak and Dr. William Longhurst*
    - Algebra-based Physics for *Dr. Xiong Pei, Dr. Andriy Kovalskiy, and Dr. Arthur Carpenter.*

Department of Mathematics, Austin Peay State University. Clarksville, TN
Teaching Assistant Jun 1 2019 – Jul 1 2020
- Empowered students with deficiencies in mathematics to rethink their study habits and to improve their mathematics skills. Developed specific lesson plans for the students to reinforce the concepts they were learning in class while also improving their skills in algebra.
- Supported courses and instructors include:
  - Single-variable Calculus for *Dr. Daniel Mayo*
  - Elementary Statistics for *Dr. Ben Ntatin and Dr. Matthew Jones.*

Leadership & Activities

Joint School of Nanoscience and Nanoengineering Greensboro, NC
Instructor, AI Methods in Advanced Materials Research Jan 22 2024 – Present
- Designed and executed course for graduate students with Machine Learning and Neural Network skills for materials research, using convolutional neural networks, Bayesian analysis and machine learning.
- Course Website : `https://github.com/JaredKeithAveritt/AI_methods_in_advanced_materials_research`.

American Physical Society Remote
K-12 Physicist To-Go Volunteer Jan 19 2020 – Present
- Engaging in a remote capacity since 2020, virtually connecting with twelve demographically diverse classrooms spanning multiple states such as PA, CO, TX, TN, NC, and MA.
- Facilitating interactive sessions by fielding inquiries from K-12 students about the role of physicists while fostering enthusiasm for physics, aiming to inspire the next generation to delve into scientific exploration.

North Central Region 5 Science and Engineering Fair Mathematics and Greensboro, NC
K-5 Physics Judge April 12 2021 – Present
- Engaged with students about their projects, promoting an atmosphere of encouragement and learning.
- Supported and recognized their efforts to expand scientific understanding, nurturing a space for development.

Joint School of Nanoscience and Nanoengineering Greensboro, NC
K-12 Outreach Events Volunteer Aug 19 2021 – Present
- Participated in a team of graduate students to deliver hands-on demonstrations in Nanoscience to spark enthusiasm for STEM education among students.
- Additionally, I serve as a Graduate Researcher Panelist, providing valuable insights and guidance to undergraduates interested in pursuing a Ph.D. in the sciences.

Draelos Scholar Program Greensboro, NC
Highschool Student Mentor Jun 11 2022 – Aug 2023
- Led a ten-week research project, teaching two students how to apply machine learning, High Performance Computing, and Density Functional Theory in academic level research.
- Mentee's applied these skills to study nanoscale devices, culminating in five-minute presentation.

Joint School of Nanoscience and Nanoengineering Greensboro, NC
Graduate Student Peer Mentor Aug 19 2021 – Present
- Mentored seven STEM-track graduate students with four combined publications, from countries including Ghana, Bangladesh, and Jordan,
- Conducted weekly sessions for three junior lab members on topics such as grant writing, research techniques, publishing, and professional development.

Baptist Medical Center Nalerigu, Ghana
Education Outreach Volunteer Jun 10 2010 - Jul 9 2010
- Collaborated with the Baptist Medical Center and a remote village impacted by tuberculosis.
- Fostering cultural harmony and building strong connections, contributed to education initiatives and distribution of vaccinations.

Awarded Grants, Fellowships and Scholarships

NSF MPS-ASCEND Postdoctoral Fellowship July 2024
- Declined Award, due to already accepting position at Los Alamos National Laboratory, it was a honor to be recommended, and difficult decision to make.
- Proposal titled: "Simulation and machine learning for ultra tough materials and enhancing STEM diversity by addressing students unspoken needs".

NSF Graduate Research Fellowship Program 2021–Present
- Grant no. 1945980, ID: 2021318933.

NSF XSEDE Start-up Allocations 2022–2023
- Modeling of molecules adsorbed on the surface of 2D materials: multi-component analysis (no. PHY220034).

Educational Peltier Cooler for Teaching and Research Advancements Nov 2023
- Funded by UNCG Graduate Student Association Research Capstone Fund.

Humidity Sensor and Controller for Atmospheric Atomic Force Microscopy Apr 2022
- Funded by UNCG Graduate Student Association Research Capstone Fund.

Study of fundamental properties of two-dimensional platform for biosensor application Oct 2020
- Funded by UNCG Graduate Student Association Research Capstone Fund.

NASA Scholarship 2018–2019
- Tennessee Space Grant Consortium (no. NNX15AR73H).

Summer Undergraduate Research Fellowship, Austin Peay State University May 2018 - Aug 2018
- Proposal Title: "Novel Bioreactor for H2 Production by Bacteria".

Presidential Research Scholarship, Austin Peay State University May 2016 – May 2017
- Proposal Title: "H2 Production from Malate or Glycerol by Photosynthetic Bacteria".

Membership of Professional Societies

Materials Research Society, Joint School of Nanoscience and Nanoengineering Chapter 2021 – Present

American Physical Society 2018 – Present

Sigma Phi Sigma Physics Honor Society 2018 – Present

Sigma Phi Sigma, Del Square Psi, Student Chapter at Austin Peay State University 2018 – 2020

Tri-Beta Biological Honor Society, Student Chapter at Austin Peay State University 2010 – 2020

Additional Experience

Handyman Moving Company. Nashville, TN
Sole proprietor, Operator Jan 2 2014 – Dec 19 2018
- My leadership and team-building skills were further honed during a break from academia, which I took to enhance my finances and fund my education.
- During this time, I founded and managed Handyman Moving Company, taking on the full spectrum of business operations.
- This role involved managing and training a team of six employees, overseeing the maintenance and scheduling of two trucks, and ensuring the highest levels of service delivery, customer satisfaction, and compliance with transportation and safety regulations.
- This experience not only strengthened my financial foundation but also deepened my leadership, organizational, and problem-solving skills, directly contributing to my academic and professional development.

Gateway Hospital. <div style="float:right">Clarksville, TN</div>
Pharmacy Technician, CPhT <div style="float:right">Jan 1 2010 – Dec 1 2011</div>

- Practiced meticulous attention to detail to ensured the accuracy of all medication compounding, reducing potential errors and safeguarding patient health.
- Demonstrated clear and concise communication with healthcare professionals and patients to ensure optimal medication management and understanding.
- Collaborated with a multidisciplinary team of healthcare professionals.
- Identified and resolved issues related to medication preparation and supply management, enhancing pharmacy efficiency and patient satisfaction.

References

Tetyana Ignatova (Co-advisor)
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University of North Carolina Greensboro
- ☎ (336) 285-2791
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Joseph Starobin (Co-advisor)
Professor
University of North Carolina Greensboro
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- ✉ jmstarob@uncg.edu

Vincent H. Crespi (Mentor)
Distinguished Professor of Chemistry, Physics, and Mat. Sci. and Eng.
Director, Penn State Materials Research Science and Engineering Center
Theory Lead, Two-Dimensional Crystal Consortium, an NSF Materials Innovation Platform at Penn State
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