D. ALEC FARBOWITZ

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SUMMARY

Generalist researcher with diverse background in renewable energy, data analysis, and nanofabrication. Strong foundation in physics, mathematics, and solar cell technology with expertise in Python, R, and statistical modeling. Seeking to apply skills and continuous learning approach to data-driven policy, particularly as applied to renewable energy.

TECHNICAL SKILLS

Programming: Python (Pandas, SciPy, Scikit-learn, Matplotlib, Seaborn, NLTK, BeautifulSoup, Selenium, xarray, lmfit, pyglotaran), R (ggplot2, dplyr, tidyverse, lubridate, modelr), SQL, C++, HTML

Data Analysis: Statistical Modeling (Regression, ANOVA, t-tests, Chi-Square, MANOVA, Kolmogorov-Smirnov), Time-Series Analysis, PCA, Decision Trees, K-Nearest Neighbors, Machine Learning, NLP

Software & Tools: MATLAB, Mathematica, COMSOL Multiphysics, Git, Linux/Unix, LabVIEW, LaTeX, Jupyter

Laboratory: UV/E-beam lithography, Physical vapor deposition, Reactive ion etching, FIB, Clean room protocols, Photoluminescence/UV-Vis spectroscopy, SEM, Ultrafast transient absorption spectroscopy

Renewable Energy: Organic bulk heterojunction photovoltaic cells, Nanoparticle ink solar cells, Solar cell characterization, Time-series energy data analysis, Performance modeling

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EDUCATION

Technical University of Denmark (DTU) | Kongens Lyngby, Denmark | *Oct 2022 – Jul 2024*
PhD Candidate, Nanophotonics (DTU Electro, degree not completed)

- Simulated, fabricated, and measured electromechanically tunable nanophotonic devices

using clean room methodology
- established collaborative partnerships at world-class institutions
- Presented current results and recent publications monthly, proofread academic publications
- *Extracurricular Activities:* DTU Climate Action – presented weekly “Good Climate News” segment to combat attritionn, organized and spoke at “Climate Night” event.

University of Sheffield | Sheffield, United Kingdom | *Oct 2020 – Sep 2021*
MSc Solar Cell Technology (Distinction)

- Fabricated and tested nanoparticle ink solar materials, coordinating device use across three departments (Biology, Chemistry, Physics)
- Conducted comprehensive review on organic bulk heterojunction and np ink solar cells
- Targeted charge generation with femtosecond and nanosecond-scale TA spectroscopy
- Performed prediction of solar cell output from changing climate conditions; cost/benefit analysis for solar recycling business
- Masters Thesis: “Ultrafast Spectroscopy Revealing the Charge and Excitonic Properties of Nanoparticle Ink Solar Cells” | Advisor: Dr. Jenny Clark
- *Extracurricular Activities:* Physics PGT Student representative – Addressed postgraduate physics student concerns with administration while liaising with Equality, Diversity, and Inclusion Committee

Johns Hopkins University | Remote | *Sep 2019 – Jun 2020*
Photonics Graduate Studies | Coursework: Quantum Mechanics III, Optical Design, Modern Physics, Global Environmental Sustainability

Penn State University | University Park, Pennsylvania | *Aug 2007 – Dec 2011*
BS Physics, BS Mathematics, BA Philosophy | Coursework: Quantum Information, Advanced Analysis, Honors Discrete Mathematics

Philipps-Universität Marburg | Marburg, Germany | *Jun 2008 – Jul 2008*
Summer Study Abroad | Dotterer Fellowship recipient | Coursework: German Language, EU Politics, European Literature

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PROFESSIONAL EXPERIENCE

Benjamin Franklin Institute of Technology | Boston, Massachusetts | *Jan 2019 – Jun 2021*
Adjunct Instructor

- Developed curriculum and delivered remote learning for undergraduate mathematics and physics courses (Pre-Calculus, Physics I & II, Physics Concepts, Physics Lab)

- Co-created and facilitated faculty governance body focused on accountability, antiracism, and equitable education

Bluebikes | Brand Ambassador / Field Bike Mechanic
June 2017 – August 2019 | Boston, Massachusetts

- Promoted Bluebikes brand and provided on-site bike maintenance and repair services
- Conducted field repairs and routine maintenance on bike-sharing fleet

Somerville Public Schools | Substitute Teacher
November 2018 – January 2019 | Somerville, Massachusetts

- Managed classrooms of 12-14 students, delivering continuous science instruction
- Engaged students through interactive learning, including educational software demonstrations

Arbor Tutoring | Allston, Massachusetts | *Mar 2011 – Dec 2018*
Physics & Mathematics Tutor

- Tutored physics and mathematics (university-level), tailoring learning plans and ongoing academic support to achieve minimum one letter grade improvement for all students

GameRaven | Game Reviewer
March 2016 – May 2016 | Remote

- Reviewed retro games with technically-detailed 1500-word articles

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PUBLICATIONS

Conference: Lepeshov, S.; **Farbowitz, D.**; Weis, T.; Hougs, N.; Heuck, M.; Lahijani, B.; Stobbe, S. "Nano-Electro-Mechanically-Tuneable Photonic Bowtie Cavities for Enhanced Light-Matter Interactions." *CLEO/Europe-EQEC 2025*, Munich, Germany, 2025.

Journal: Lepeshov, S.; **Farbowitz, D.**; Weis, T.; Lu, B.; Lahijani, B.; Heuck, M.; Stobbe, S. "Nanoelectromechanical Spectral Control of Silicon Bowtie Nanocavities." *ACS Nano*, accepted.

PROJECTS

Bank Green | Remote | *Sep 2025 – Present* | **Ratings/Impact Team Researcher**

- Researched and reviewed 6 banks across different countries for sustainability ratings
- Resolved discrepancies between projects falsely listed as renewable energy initiatives
- Spearheaded initiative to find local sustainable banks by distance using public and local databases

- Assessed research methodologies to approximate CO2e generated from various actions

American Anthropologist Journal Meta-Analysis | *Aug 2021 – May 2022*

- Scraped web data, converted PDFs to text, and applied PyResearchInsights library across 133-year journal history
- Applied machine learning, regression analysis, and NLP to identify publishing trends

Mass Spectroscopy Automation via PCA | *Oct 2022 – Dec 2024*

- Wrote Python code to isolate signals in MALDI-TOF XML data outputs (6000+ files)
- Implemented data merging and cleaning for species identification; created visualizations using auto-correlation techniques
- Cross-verified results using SpecieScan GitHub project for biomarker identification in salmon and trout

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PROFESSIONAL DEVELOPMENT

Hack the Box | *Oct 2025 – Present*
Courses: Penetration Testing

MITx Online | *Aug 2024 – Mar 2025*
Courses: Good Economics for Hard Times, Data Analysis for Social Scientists, Designing and Running Randomized Evaluations

Coursera | *Jan 2025 – Mar 2025*
Courses: Life Cycle Analysis

School on the Frontiers of Light-Matter Interaction | *Jul 2023* | ICFO, Casteldefells, Spain

Fostered collaborative efforts between research groups and cutting edge developments in light-matter interaction, cathodoluminescence, and TEM techniques

"Technology Leaving No One Behind" Innovation Bootcamp | December 2022 | DTU Skylab, Kongens Lyngby, Denmark

Codecademy | *Mar 2021 – Present*
Developed Python, SQL skills

AWARDS / HONORS

Sigma Pi Sigma | Dotterer Fellowship | Physics Scholarship | Laser Safety Certification | Chemical Handling Safety | Radiation Safety