Calder Lenhart

calderlen@gmail.com
calderlen.github.io

Education

Ohio State University Columbus, OH
BS: Physics; Astronomy and Astrophysics (with Research Distinction) Aug 2020 - Dec 2024
Minors: Mathematics; History **GPA: 3.701/4**

Courses: *Elementary Particle Physics, Applied Differential Geometry, Cosmology, Honors E&M I/II, Honors Quantum Mechanics I/II, Statistical Mechanics, Advanced Physics Laboratory, Big Data Analytics, Methods of Astronomical Observation & Data Analysis, Real Analysis, Applied Statistics, Python, MATLAB, Flight Vehicle Dynamics, Thermodynamics, Electrical Circuits and Electronic Devices*

Publications

- **(In prep.) Lenhart, C.**, Johnson, M. C., Wang, J., Asnodkar, A. P., Petz, S., Strassmeier, K. G., Ilyin, I., "PEPSI Investigation, Retrieval, and Atlas of Numerous Giant Atmospheres (PIRANGA). II. Phase Resolved Cross-Correlation Transmission Spectroscopy of KELT-20b"

Presentations

- **Lenhart, C.**, Johnson, M. C., Wang, J., Asnodkar, A. P., Petz, S., Strassmeier, K. G., Ilyin, I. *"Analysis of KELT-20b's Atmospheric Dynamics Using PEPSI: Line Profiles During Transit and Velocity Offsets"* 2024, AAS 243, 135, 179.09
- **Lenhart, C.**, Johnson, M. C. *"Analysis of an Ultra Hot Jupiter's Atmosphere"* Ohio State Department of Astronomy Summer Undergraduate Research Program in Astrophysics Symposium

Research Experience

- **Undergraduate Astrophysics Researcher** Columbus, OH
  Ohio State University, Astronomy — Dr. Marshall C. Johnson May 2023 - Present
  - Developed and optimized Python scripts for processing ultra-hot gas giant exoplanet atmospheric spectroscopy data from the Large Binocular Telescope, refactoring data reduction pipelines and automating multiple processing steps.
  - Discovered new atmospheric elements in KELT-20b using advanced signal processing techniques, including cross-correlation, least-squares deconvolution, and Markov Chain Monte Carlo algorithms; presented findings at the 243rd American Astronomical Society conference.
  - Identified and characterized atmospheric phenomena by comparing observational data with physical parameterizations in computational models of dynamical and radiative transfer processes, utilizing Navier-Stokes equations and grid-based discretization.
  - Awarded scholarship to conduct research full-time; published results in a peer-reviewed astronomical journal and completed undergraduate thesis.
- **Undergraduate Materials Science Researcher** Columbus, OH
  Ohio State University, Materials Science & Engineering — Prof. Sheikh Akbar June 2022 - May 2023
  - Designed and completed hydrothermal synthesis reactions of metal oxide nanostructures to be used in next-generation gas sensors.
  - Measured electrical resistivity, response time, and selectivity of metal oxide gas sensors under exposure to toxic and non-toxic gases.
  - Contributed to development of the Open Database Of Resistive-type Sensors (ODORS) by aggregating experimental data and literature reviews, facilitating trend analysis in sensor selectivity and sensitivity.

Work Experience

- **Prviate Tutor** Remote
  Wyzant June 2022 - May 2023
  - Created study plans for students, managed all communication and scheduling; clients ranged from middle school to college students of math, physics, standardized tests.
  - Maintained a perfect 5.0/5.0 rating across 30+ reviews, earning six unsolicited testimonials; recognized as a top tutor in Columbus, OH, and sitewide for online tutoring in calculus and physics.
- **Mathematics Tutor** Columbus, OH
  Ohio State University, Mathematics and Statistics Learning Center December 2021 - August 2022
  - Tutored calculus to over 20 students weekly, effectively communicating complex concepts and providing tailored support to enhance student comprehension and performance.
  - Managed student communications and appointment scheduling, applying inquiry-based learning methods to foster critical thinking and deeper understanding.

Projects

- **Deep Learning: Fantasy Football Performance Predictor** Ongoing
  - Developed a Gated Recurrent Unit Recurrent Network with TensorFlow to capture temporal dependencies in NFL player performance with a dataset spanning more than 450 weeks; engineered more than 500 features.
  - Predicted fantasy football scores with a mean absolute error of $< 15\%$ in test set.
- **Machine Learning: Linking Writing Processes to Writing Quality** Kaggle
  November 2023 - December 2023
  - Developed a Histogram-based Gradient Boosting Regression Tree with Scikit-learn to predict writing quality of mock SAT essays using keystroke logs; engineered features from computational linguistics literature, tuned hyperparameters, and analyzed feature importance; placed in 63rd percentile in Kaggle competition.
- **Make OH/IO 2023 Competition** Ohio State University
  March 2023
  - Proposed an updated cleanroom garment with tear sensors, improved boot covers, and redesigned masks for use in Intel's semiconductor factories; designed a proof-of-concept using an Arduino board and cleanroom garment materials; won 1st place in the competition.
- **Buckeye Solar Racing Team** Ohio State University
  Aerodynamicist August 2021 - August 2022
  - Researched performance of various solar car geometries, designed canopy and aeroshell in SolidWorks, ran CFD with STAR-CCM+.
  - Meshed existing canopy with photogrammetry software, compared prototypes to physical model, finalized design, integrated with remainder of solar car.
- **NASA L'SPACE Mission Concept Academy** Online
  Aerospace Engineer May 2021 - August 2021
  - Collaborated with 10-person interdisciplinary team to conceptualize a mission to drill water-ice from the lunar south pole, including site selection with JMARS GIS software, rover design with SolidWorks CAD, development of Risk Management Plan, and success criteria.
  - Modeled entry, descent, and landing of a lunar rover; prototyped compact lunar regolith drill; formulated a CONOPS; budgeted instrumentation; produced a Preliminary Design Review.

Skills

Languages: Python, MATLAB, Mathematica, HTML, CSS
Tools: Bash/Linux, Git, LaTeX, High-performance Computing
Machine Learning, Deep Learning, Adobe Creative Suite

Honors and Awards

Ann Slusher Tuttle Undergraduate Scholarship, Ohio State Department of Astronomy — January 2024
Undergraduate Research Scholarship, Ohio State College of Arts and Sciences — December 2023
MakeOHI/O 2023 1st Place (Intel Competition) — March 2023
Dean's List — 6 semesters
Eagle Scout — July 2020
Youngstown CityScape Beautification Watch Award — November 2019