Calder Lenhart

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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**

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