EMAIL: allisonznliu@gmail.com | GITHUB: a11isonliu | WEBSITE: www.allisonznliu.com

ALLISON LIU

Recent Master's graduate with 6 years of student-research experience. Passionate about using mathematical analysis and machine learning techniques to understand patterns in data and develop solutions for improving sustainability.

EDUCATION

MAY 2022 – MAY 2023

University of Colorado Boulder
M.S. Applied Mathematics, GPA 3.86/4.00

- **Thesis: Event Detection in Spatio-Temporal Data Using Singular Value Decompositions.**
  - Applied data transformations to solar image data to understand solar flaring events.
- Coursework focused on numerical methods, statistical learning, statistical analysis, applications of machine-learning techniques.

AUGUST 2018 – MAY 2022

University of Colorado Boulder
B.S. Applied Mathematics, GPA 3.72/4.00 - Cum Laude with Honors
Minor: Computer Science

- Coursework focused on mathematical analysis and modeling, linear algebra, and machine learning. Computer science coursework in data structures, algorithm design/optimization, deep neural networks, data analysis, regressions, database systems.
- Awards/Honors: Engineering Honors Program, BOLD Scholar, Dean's List, Pres. Horace M. Hale Award, College of Engineering 2022 Outstanding Graduate
- Clubs/Organizations: Society of Women Engineers (SWE), CU Women's Ultimate Frisbee

PROFESSIONAL EXPERIENCE

FEBRUARY 2021 – DECEMBER 2022

Laboratory for Atmospheric and Space Physics (LASP) - University of Colorado Boulder
Student Research Assistant

- Trained and optimized a generative adversarial network to combine historic and current data to create a machine-learning ready dataset for solar flare prediction.
  - Data pre-processing and exploration, feature engineering, and statistical analysis of results.

JUNE 2017 – AUGUST 2020

Kapteyn-Murnane Group, JILA - University of Colorado Boulder
Student Research Assistant

- Designed and built a commercial-quality M^2 laser diagnostic device in MATLAB. Interfaced multiple pieces of scientific equipment and created a graphical user interface to collect and analyze data.
- Implemented a modified phase-retrieval algorithm to fully characterize a laser beam.
- Interfaced a novel laser system with an existing chemical engineering experiment.

SEPTEMBER 2020 – AUGUST 2022

Climbing Gym Routesetter at University of Colorado Boulder

- Worked with a team to create unique and complex climbs for the CU Climbing Gym.

VOLUNTEERING & OUTREACH

MAY 2022 – JUNE 2022

Boulder Solar Alliance Research Experience for Undergraduates (REU)

- Developed and led python programming tutorials for undergraduate research students

MAY 2021 – JULY 2021

Machine Learning STEM Camp

- Developed and taught machine learning curriculum to high school students for a STEM summer program

FEBRUARY 2020 – MAY 2020

Partnerships for Informal Education in the Community (PISEC)

- Volunteered weekly as a STEM mentor for elementary school students of underrepresented minorities

SKILLS

TECHNICAL LANGUAGES	Python (PyTorch, Tensorflow, numpy, pandas), MATLAB, R, HTML, CSS Limited - SQL, C++
TOOLS/TECHNOLOGIES	Unix/Linux, Git, Latex, Bash Shell, Mathematica
MANUFACTURING	Woodworking (I have built a ukulele!), laser-cutting, soldering, machining
LANGUAGES	English – Native, Mandarin (Chinese) – Proficient

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PUBLICATIONS & PRESENTATIONS

- Data Augmentation of Magnetograms for Solar Flare Prediction using Generative Adversarial Networks.
  A. Liu, W. Carande. *Poster Presented at the American Geophysical Union Conference: New Orleans, LA (2021)*. DOI: 10.1002/essoar.10510080.1
- Generation of extreme-ultraviolet beams with time-varying orbital angular momentum.
  L. Rego, K. Dorney, N. Brooks, Q. Nguyen, C. T. Liao, J. San Román, D. Couch, **A. Liu**, E. Pisanty, M. Lewenstein, L. Plaja, H. C. Kapteyn, M. M. Murnane, & C. Hernández-García. *Science 364*, 6447 (2019). DOI: 10.1126/science.aaw9486
- Detection of the Keto-Enol Tautomerization in Acetaldehyde, Acetone, Cyclohexanone, and Methyl Vinyl Ketone with a Novel VUV Light Source.
  D. Couch, Q. Nguyen, **A. Liu**, D. Hickstein, H. Kapteyn, M. Murnane, & N. Labbe. *Proc. Combust. Inst. 38* (2021). DOI: 10.1010/j.proci.2020.06.139