

Allison Liu

I am an Applied Math master's student who is excited about using programming, mathematical analysis, and machine learning techniques to solve difficult research problems.

WORK EXPERIENCE

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

Student Research Assistant, February 2021 – Present

- Building, training, and optimizing a generative adversarial network to create a machine-learning ready dataset for solar flare prediction. Using historic and current magnetogram data—Data pre-processing and exploration, feature engineering, and statistical analysis of results.

Kapteyn-Murnane Group, JILA - University of Colorado Boulder

Student Research Assistant, June 2017 – August 2020

- Designed and built a commercial-quality M² laser diagnostic device in MATLAB. I interfaced multiple pieces of scientific equipment and created a graphical user interface to collect and analyze data. Later implemented a modified phase-retrieval algorithm to fully characterize a laser beam.
- Interfaced a novel laser system with an existing chemical engineering experiment.

EDUCATION

University of Colorado Boulder, August 2018 – May 2022

B.S. Applied Mathematics, GPA 3.7/4.0 - 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, algorithms, software development, artificial intelligence.
- Awards/Honors: Engineering Honors Program, BOLD Scholar, Dean's List, College of Engineering Research Award (2022)
- Clubs and Organizations: Society of Women Engineers (SWE), CU Women's Ultimate Frisbee

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

VOLUNTEERING/OUTREACH

Boulder Solar Alliance Research Experience for Undergraduates (REU), May 2022

- Created and led python programming tutorials for undergraduate summer research students

Machine Learning STEM Camp, May 2021 – July 2021

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

Partnerships for Informal Education in the Community (PISEC), February 2020 – May 2020

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

SKILLS AND INTERESTS

- Technical Languages: Python, MATLAB, C++, SQL, HTML, CSS
- Tools and Technologies: Unix/Linux, Git, Latex, Bash Shell, Mathematica
- Manufacturing: woodworking (I have built a ukulele!), laser-cutting, soldering, machining
- Climbing gym routesetter at University of Colorado Boulder (September 2020-Present)