




Annika Salmi

MPhil student at Cambridge in Planetary Science and Life in the Universe. Interested in using simulation engineering background to do dynamics simulations and to model solar system atmospheres.

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Education

Trinity Hall, University of Cambridge

Oct 2024 - present

MPhil in Planetary Science and Life in the Universe

- Modules including: Planetary System Dynamics (part of NatSci Physics Part III); Extrasolar Planets: Atmospheres and Interiors
- Final group project: Assessing the habitability and potential detectability of life on planets around M dwarfs, with subproject: Potential of future missions to detect NH_3 in exoplanet atmospheres around M-dwarfs

Yale University

Aug 2017 - Dec 2021

Bachelor of Arts double major in Physics and Astronomy

- GPA: 3.6/4.0 (UK 2:1 equivalent); final two years 3.8/4.0
- Undergraduate Thesis Title: Correlating mapped nuclear dust with AGN obscuration
- Modules including: Astrostatistics and Data Mining; Scientific Computing in Astrophysics; Research Methods in Astrophysics; Exoplanets and Data Science
- Research semester in Fall 2020, studying dust around supermassive black holes

Princeton University

June 2020

Physics of Life Summer Program

Work & Research Experience

Simulation Engineer

Seattle, Washington

Starfish Space

Aug 2022 – June 2024

- Architected and wrote a pipeline to process and clean on-orbit data for ground analysis. Used this tool to determine physics simulation accuracy; found the simulation was already 95% accurate.
- Upgraded and enhanced simulated images to more effectively train the navigation convolutional neural network (CNN). Also contributed to the training of the CNN. Designed and led hardware camera testing to determine noise to add to synthetic Blender images.
- Modeled low Earth orbit physics in a Basilisk physics simulation to solve for drag. Obtained a value for coefficient of drag lower than accepted literature value of 2.2.
- Improved dynamics simulation model performance by 30%, by rewriting slow algorithms, by tailoring cloud tools, and changing build processes. Dynamics simulation is Python wrapping C++ code; contributed in both languages. Also improved simulation UI for everyone who interacted with the simulation.

Research Assistant

Yale University

Urry Lab

Sep 2020 – Dec 2021

- Mapped galaxy dust distributions of 109 galaxies with active galactic nuclei (AGN) to resolve whether galactic dust obscured AGN X-ray radiation
- Wrote an algorithm that combined infrared and optical Hubble images to illuminate the galactic dust.
- Established a GitHub package that when installed, creates attenuation (dust) maps of galaxies.
- Presented at a senior thesis Mellon Forum; funded by the Richter Memorial Fund.

Research Assistant

Yale University

Newburgh Lab

Aug 2019 – Aug 2020

- Generated channel telescope frequency versus intensity graphs of well-known bright stars on the Canadian Hydrogen Intensity Mapping Experiment (CHIME) to find telescope accuracy. Found 5 frequency channels that were over- and under-measuring intensity; results calibrated telescope.
- Research done with Cedar supercomputer; funded by the Richter Memorial Fund.

Museum Assistant in Paleobotany

Yale University

Peabody Museum

Aug 2018 – Dec 2018

- Updated online database of 5000+ collection specimens to track lending to peer institutions.

Science Communication

Teaching & mentoring

Science night volunteer

Institute of Astronomy

Cambridge

Oct 2024 – Present

Women in STEM mentor

IGNITE Worldwide

Seattle, Washington

Aug 2022 – June 2024

President Spring 2018 - Dec 2021

Starlab

Yale University

Aug 2017 – Dec 2021

- Wrote and presented planetarium shows to New Haven students; taught Yale students to communicate science.

Scientific community collaboration

Student

Joint Antarctic Science Expedition

Antarctica

Dec 2016

- Cross-cultural expedition with Chilean and American students; funded by National Science Foundation.

Science writing

SciTech Desk Writer

Yale Daily News

Yale University

Aug 2020 – June 2021

Astronomy popular science writing has also appeared in publications such as Matador Network, Study Breaks

Technical Skills

Skills: Cleaning and analyzing astronomical images, generating synthetic images, scientific and big data cloud computing, MCMC simulations, satellite orbit determination filtering algorithms, scientific writing

Languages: Python (6 years), Bash/Unix scripting (4 years), C++ (3 years), MATLAB (2 years), R (2 years), YAML (2 years)

Software tools: *Astronomy:* DS9, FITS, *Synthetic images:* Blender, cuda, *Aerospace:* Freeflyer, *Developer:* Linux, Git, Jira, VSCode, *Cloud:* Google Cloud, Kubernetes, Docker

Projects

[mdwarf-habitability](#) [↗](#)

2024, in progress

- Predict the number of habitable zone M-dwarf planetary atmospheres HWO and LIFE will see using an MCMC simulated planetary population. Have successfully recreated LIFE results; will then look at HWO. It will then look at the potential for atmosphere observability within the subset of predicted planets.

[exo-venus-evolution](#) [↗](#)

2024, in progress

- Model the evolution of "exo-Venuses" over their geological history, using Venus and exo-Venus data. Works by modifying planetary radius, mass, distance from star, and other stellar properties; assumes that any other planetary features (i.e. surface, atmosphere) match Venus.

[alignpy](#) [↗](#)

2020

- Built a tool that locally downloads FITS files of astronomical objects, specified by filter and catalog. Once they are downloaded, the image files can be aligned and plotted via addition, subtraction, or division

Activities

Cambridge University Mountaineering Club

Cambridge, present

Trinity Hall Rowing

Cambridge, present

Captain 2019-2020

Yale Free & Alpine Ski Team

Yale University

Aug 2017 – Dec 2021

- Coached teammates and led the team to an overall finish of second place.

Languages: English (native), Spanish (advanced), French (intermediate)

Dual citizen of USA and Finland. Current holder of UK student visa