

Annika Salmi

MPhil student at Cambridge in Planetary Sciences and Life in the Universe. Interested in using simulation engineering background to model planetary atmospheres.

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Education

Trinity Hall, University of Cambridge

Oct 2024 - present

MPhil in Planetary Sciences and Life in the Universe

- Modules: Origin of Planets; Planetary System Dynamics; Extrasolar Planets: Atmospheres and Interiors

Yale University

Aug 2017 - Dec 2021

Bachelor of Arts double major in Physics and Astronomy

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

Princeton University

June 2020

Physics of Life Summer Program

Work & Research Experience

Simulation Engineer

Seattle, Washington

Starfish Space

Aug 2022 - June 2024

- Wrote the company tool that uses on-orbit data to find the current location of the satellite in orbit. Used this tool to determine physics simulation accuracy; found the simulation was already 95% accurate.
- 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.
- Added hot pixels, cosmic rays, and blurring to synthetic Blender satellite images to train the navigation model. Created thousands of images as part of this iterative process.
- Architected and wrote a pipeline to process and clean on-orbit data for ground analysis.
- Improved simulation performance by 30%, by rewriting slow algorithms, by tailoring cloud tools, and changing build processes. 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 whether dust obscured X-ray radiation from the AGN.
- 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.
- Reorganized thousands of specimens in the paleobotany collection to reflect new science.

Volunteering

Science Communication

Volunteer

Institute of Astronomy

Cambridge

Oct 2024 – Present

- Help run weekly “science nights” where members of the listen to lectures from astronomers at Cambridge.

Docent

Exploratorium Museum

San Francisco

Jan 2017 – June 2017

- Explained exhibits to visitors and ran public dissections in San Francisco’s premier hands-on science museum.

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

- Contributed articles such as “New study reveals black holes are spinning like crazy.”

Technical Skills

Skills: Cleaning and analyzing astronomical images, generating synthetic images, scientific and big data cloud computing, 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

exo-venus-evolution (*in progress*)

- Model the evolution of “exo-Venuses” over their geological history, using Venus and exo-Venus data.
- Tools used: Python

exo-atm-predict (*in progress*)

- Select a discovered exoplanet and the tool tells you what the most “likely” characteristics of its atmosphere will be, based on what astronomers have already observed. Very biased; can be useful to see what those biases are. Specifically examining M-dwarfs with results.
- Tools used: Python

alignpy

- 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.
- Tools Used: Python, HTML

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), Portuguese (beginner)

Dual citizen of USA and Finland. Holder of UK student visa