


# Annika Salmi

PhD student at ETH Zurich in three departments, Physics, Earth and Planetary Sciences, and Environmental Systems Science. Currently modeling carbon and sulfur cycles on exoplanets.

✉ aks206@cam.ac.uk    annikasalmi.com    annikasalmi    annikasalmi

## Education

### ETH Zurich

Oct 2025 - present

*PhD student*

- Supervised by Professor Caroline Dorn, Professor Paul Tackley, and Professor Loic Pellisier

### Trinity Hall, University of Cambridge

Oct 2024 - July 2025

*MPhil in Planetary Science and Life in the Universe*

- Mark: Distinction (highest mark possible)
- Modules including Planetary System Dynamics (part of NatSci Physics Part III)
- Thesis: Simulating LIFE and HWO's future detections. Received an overall award for Excellence for the thesis. Supervised by Professor Amy Bonsor

### 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**

*Peabody Museum*

*Yale University*

*Aug 2018 – Dec 2018*

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

### **Science Communication**

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#### **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**

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**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**

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#### **mdwarf-habitability** [↗](#)

*2025*

- 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.

#### **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**

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#### **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**