

# Patrick Costa

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## RESEARCH

### LEIDEN UNIVERSITY | GRADUATE RESEARCH

Oct 2024 – Present | Leiden, NL

- Using Python and star data to investigate escaping atmospheres of habitable zone exoplanets.
- Determining the relationship between star properties and absorbed UV and X-ray light by exoplanets.
- Re-purposing existing code to find an overlap between the UV habitable zone and the circumstellar habitable zone.
- This project is part of the Astronomy Research MSc program at Leiden University and is projected to result in a published paper in late-2025.

### UNIVERSITY OF WASHINGTON | RESEARCH ASSISTANT

Feb 2022 – Sept 2023 | Seattle, WA

- Used partial differential equations, orbital mechanics, and Python to calculate the information matrix of the orbital elements in a planet-moon system transiting a star.
- Used machine learning (MCMC) to verify results.
- Hired part-time post-graduation, determined the direction of the project, and worked with minimal guidance.

### UNIVERSITY OF WASHINGTON | UNDERGRADUATE RESEARCH

Sept 2019 – Dec 2019 | Seattle, WA

- Identified stellar rotators from Kepler K2 light curves.
- Determined predictors of data being from stellar rotators.
- Presented results to the University of Washington Astronomy Department.

## PROJECTS

### ADVANCED HOCKEY STATISTICS | INDEPENDENT PROJECT

Nov 2023 – Jan 2024 | Wakefield, RI

- Used R to visualize the performance of professional hockey players throughout their careers.
- Used machine learning libraries to develop predictive models.
- Explored various goodness-of-fit assessment methods to determine the quality of the models.

### COSMOLOGICAL MODELLING | COURSE FINAL PROJECT

Feb 2023 – March 2023 | Seattle, WA

- Used supernovae data to develop a cosmological model for a hypothetical universe.
- Used machine learning methods to determine the composition of a universe.
- Used statistical analysis to evaluate the model's goodness of fit.

### OBSERVATIONAL ASTRONOMY | COURSE FINAL PROJECT

March 2022 – June 2022 | Seattle, WA

- Remotely connected to the Apache Point Observatory FlareCam telescope to observe globular cluster M3 in the B and V bands.
- Performed data reduction using Python to estimate the age of M3.
- Communicated findings in a final paper.

## EDUCATION

### LEIDEN UNIVERSITY

MASTER OF SCIENCE IN ASTRONOMY  
RESEARCH

Expected August 2026 | Leiden, NL

Cum. GPA: TBD / 10.0

### UNIVERSITY OF WASHINGTON

BACHELOR OF SCIENCE IN PHYSICS  
AND ASTRONOMY

Sept 2019 - March 2023 | Seattle, WA

Cum. GPA: 3.52 / 4.0

## SKILLS

### PROGRAMMING

5+ years:

Python • Git

1+ years:

R

### TECHNOLOGY

Linux • Windows

Machine Learning

## COURSEWORK

### GRADUATE

Effective Field Theory

Origin and Evolution of the Universe

General Relativity

### UNDERGRADUATE

Exoplanets

Cosmology

Astrostatistics

Calculus I-IV

Computational Methods in Astrophysics

## LINKS

Personal Website:

<https://pcostauw.github.io/index.html>

LinkedIn:

<https://www.linkedin.com/in/patrick-costa-323842195/>