

# Cathal Maguire

PhD Student in Astrophysics · Trinity College Dublin

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## Personal Information

**Date of Birth** 25/07/1998

**Nationality** Irish

## Education

2020–Present **Ph.D. in Physics**, *Trinity College Dublin*, College Green, Dublin 2  
– *Expected Graduation: September 2024*

2016–2020 **B.A. in Physics & Astrophysics**, *Trinity College Dublin*, College Green, Dublin 2  
– *First Class Honours (Trinity Gold Medal Recipient)*

## Research Experience

2020–Present **Postgraduate Researcher**, *Trinity College Dublin*, College Green, Dublin 2

- High-resolution transmission spectroscopy observations of exoplanetary atmospheres, under the supervision of Prof. Neale Gibson.
- Utilising advanced Bayesian inference techniques to constrain the atmospheric composition and dynamics of primarily ultra-hot Jupiters.

Mar 2023–May 2023 **SSDF Studentship**, *European Southern Observatory*, Santiago, Chile

- Compared efficacy of high-resolution telluric removal techniques, under the co-supervision of Elyar Sedaghati and Alain Smette.
- Conducted multiple nights of observations at the Very Large Telescope (VLT), Paranal Observatory.
- Utilised the ESPRESSO instrument for both scientific and calibration observations.

Jun 2020–Aug 2020 **Research Assistant**, *PRACE*, CINECA, Bologna, Italy

- Worked remotely as part of the PRACE Summer of High-Performance Computing (SoHPC), under the supervision of Prof. Salvatore Orlando.
- Simulated highly energetic supernova explosions, and investigated their morphology and interactions with objects in their surrounding environments.

Sep 2019–Jan 2020 **Undergraduate Research Project**, *Trinity College Dublin*, College Green, Dublin 2

- Investigated the stellar wind of the red supergiant star Alpha Orionis, under the supervision of Prof. Aline Vidotto.
- Stellar wind simulations were compared with radio observations, culminating in my undergraduate thesis.

## Publications & Conference Talks (selected)

### First-author peer-reviewed publications

C. Maguire, N. P. Gibson, S. K. Nugroho, S. Ramkumar, M. Fortune, S. R. Merritt, & E. de Mooij (2023). *High-resolution atmospheric retrievals of WASP-121b transmission spectroscopy with ESPRESSO: Consistent relative abundance constraints across multiple epochs and instruments*, *MNRAS*, **519**, 1030.

## Conference Talks

- August 2023 **Irish National Astronomy Meeting (INAM) 2023**, *University College Cork*
- July 2023 **Exoplanets by the Lake**, *Vier Jahreszeiten Hotel, Starnberg*
- November 2022 **DUBlin STar formation, DeBris disks and plaNets (DUSTBIN) Meeting**, *Maynooth University*
- September 2022 **AIP Thinkshop 2022: High-resolution spectroscopy for exoplanet atmospheres and biomarkers**, *Leibniz Institute for Astrophysics, Potsdam*
- August 2022 **Irish National Astronomy Meeting (INAM) 2022**, *Dunsink Observatory*

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## Teaching & Outreach

- Sep 2020–May 2023 **Teaching Assistant**, *Trinity College Dublin, College Green, Dublin 2*
- Undergraduate teaching assistant for Junior Sophister astrophysical labs.
  - Assisted students with laboratory exercises and maintained lab manuals and equipment.
- Sep 2020–May 2022 **STEM Mentor**, *Innumeris Education*
- Provided guidance to final year secondary school students from underrepresented backgrounds.
  - Assisted students with university admissions procedures, whilst providing tutoring and academic advice.

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## Professional Skills

- Research Interests** Exoplanetary atmospheres (observations & modelling), High-resolution spectroscopy, Cross-correlation analysis, Atmospheric retrievals, Planet formation, High-performance computing, Telluric correction of high-resolution spectra.
- Programming Languages** Python (Advanced), IDL (Intermediate), C/C++ (Intermediate), bash (Advanced), JavaScript (Basic).
- Web Interface & Misc.** LaTeX (advanced), HTML/CSS (Intermediate)
- Data Analysis Techniques** Bayesian inference with MCMC, Cross-correlation analysis.

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## Languages

- English **Mothertongue**
- Irish **Fluent**
- Spanish **Intermediate**

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## Interests & Activities

I am passionate about sports, having participated in teams across a variety of sports, including soccer and gaelic football.

I am also interested in science and advancing technologies, with my main interest coming in the physical and space sciences.