

# Swaetha Ramkumar

## PhD Candidate in Astrophysics at Trinity College Dublin

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🌐 sramkumar

🌐 <https://swaetharamkumar.github.io/>

## Education

- 2021 – Present     📖 **Ph.D. in Physics, Trinity College Dublin**  
(Provisional) Thesis title: *Atmospheres of Alien Worlds: Exploring New Methodology for Doppler-Resolved Spectroscopy of Exoplanets*  
**Supervisor:** Prof. Neale P. Gibson
- 2019 – 2020     📖 **M.Sc. in Astrophysics, University College London (UCL)**  
Thesis title: *Assessing the stability of nuclear disc orbits against migrating resonances.*  
**Supervisor:** Dr. Ralph Schoenrich  
**Distinction**
- 2016 – 2019     📖 **B.Sc. in Physics, Amrita Vishwa Vidyapeetham**  
Project title: *Basic properties of Solar and Interstellar Plasma.*  
**Supervisor:** Dr. Bharat Kishore Sharma  
**First Class with Distinction (CGPA: 9.10 out of 10)**

## Research Publications

### First-Authored

- 1     **S. Ramkumar**, N. P. Gibson, S. K. Nugroho, C. Maguire, and M. Fortune, “High-resolution emission spectroscopy retrievals of MASCARA-1b with CRIRES+: strong detections of CO, H<sub>2</sub>O, and Fe emission lines and a C/O consistent with solar,” *MNRAS*, 2023. 🌐 DOI: 10.1093/mnras/stad2476.

### Co-Authored

- 1     M. Fortune, N. P. Gibson, D. Foreman-Mackey, T. M. Evans-Soma, C. Maguire, and **S. Ramkumar**, “How do wavelength correlations affect transmission spectra? Application of a new fast and flexible 2D Gaussian process framework to transiting exoplanet spectroscopy,” *arXiv e-prints*, 2024. 🌐 DOI: 10.48550/arXiv.2402.15204.
- 2     C. Maguire, N. P. Gibson, S. K. Nugroho, M. Fortune, **S. Ramkumar**, S. Gandhi, and E. de Mooij, “High-resolution atmospheric retrievals of WASP-76b transmission spectroscopy with ESPRESSO: Monitoring limb asymmetries across multiple transits,” *arXiv e-prints*, 2024. 🌐 DOI: 10.48550/arXiv.2404.10463.
- 3     C. Maguire, N. P. Gibson, S. K. Nugroho, **S. Ramkumar**, M. Fortune, S. R. Merritt, and E. de Mooij, “High-resolution atmospheric retrievals of WASP-121b transmission spectroscopy with ESPRESSO: Consistent relative abundance constraints across multiple epochs and instruments,” *MNRAS*, 2023. 🌐 DOI: 10.1093/mnras/stac3388.

## Talks and Presentations

- 2024     📖 **Atmospheres of Alien Worlds.**  
*IOP Ireland Spring Conference: Rosse Medal entrant, Apr 06, 2024 (poster presentation).*
- 2023     📖 **MASCARA: does it help your eyelash?**  
*Irish National Astronomy Meeting (INAM) 2023, Aug 24-25, 2023 (contributed talk).*

## Talks and Presentations (continued)

- **High-resolution emission spectroscopy retrievals of MASCARA-1b with CRIRES+**  
*Exoplanets by the Lake Summer School, Jul 31-Aug 4, 2023 (contributed talk).*
- **MASCARA: does it help your eyelash? High-resolution emission spectroscopy retrievals of MASCARA-1b with CRIRES+**  
*2023 Sagan Exoplanet Summer Hybrid Workshop, Jul 24-28, 2023 (poster presentation).*
- **The atmosphere of MASCARA-1b through the eyes of CRIRES+**  
*Theo Murphy meeting, the Royal Society: Spectroscopy of exoplanets at high resolution, Feb 6-7, 2023 (flash talk).*

## Observing Experience and Proposals

- 2023 ■ **CRIRES+ at the Very Large Telescope (VLT)**  
*Phase Curve observations (K-band) in designated Visitor Mode (dVM) during cycle P112, PI: Gibson, CoI: S. Ramkumar.*

## Teaching and Outreach

- 2021 – 2024 ■ **Teaching Assistant in PYU33AP4 - JS AP Astro Computational Lab**  
*Trinity College Dublin*
- Oct 2023 – Nov 2023 ■ **Teaching Assistant in PYU33AP3 - JS Practical in Astrophysics**  
*Trinity College Dublin*
- Apr 2023 ■ **Transition Year Physics Experience (TYPE) Mentor**  
*Trinity College Dublin*  
Mentor for the poster session - the Transition Year Physics Experience (TYPE) programme.
- Nov 2022 – Mar 2023 ■ **STEM@Universi-TY Educator**  
*Trinity Walton Club, Trinity College Dublin*  
<https://www.tcd.ie/waltonclub/ty.php>

## Prizes, Awards & Grants

- 2021 – Present ■ **Research Grant**, Provost's PhD Award  
*Trinity College Dublin*
- Aug 2023 ■ **Peter Curran Award**  
*Astronomical Society of Ireland (ASI)*  
The award recognises the best contributions to the Irish National Astronomy Meeting (INAM) by a graduate student presenter for the year 2023.  
<https://astronomers.ie/peter-curran-award/>

## Technical Skills

- Research Interests ■ Exoplanet atmospheres (observations and modelling), High-resolution spectroscopy, Cross-correlation analysis, Atmospheric retrievals, Planet formation.
- Programming ■ Python (*advanced*), C/C++ (*intermediate*), SQL (*basic*)
- Markup Languages ■ L<sup>A</sup>T<sub>E</sub>X (*advanced*), HTML (*intermediate*)
- Miscellaneous ■ Bayesian inference with MCMC, Cross-correlation analysis

# Languages

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- English  **Fluent**
- Tamil  **Mother tongue**
- Hindi  **Conversational**