# SPANDAN DASH

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## EDUCATION

**University of Warwick, Coventry, The United Kingdom** *October 2021 - April 2025*
PhD in Physics (Astrophysics group)

**Leiden University, The Netherlands** *September 2017 - August 2019*
2 year Master of Science in Astronomy (Research) Overall CGPA: 8.11 (Course) + 7.5 (both theses) = 7.79/10
Leiden Observatory, Faculty of Science

**Indian Institute of Science, Bangalore, India** *August 2013 - June 2017*
4 year Bachelor of Science (Research) in Physics Overall CGPA: 6.8/8.0

## WORK EXPERIENCE

**PhD student on a Chancellors International Scholarship** *October 2021 - April 2025*
Worked on the topic of high-resolution spectroscopy of sub-Jovian exoplanet atmospheres in the Astronomy and Astrophysics group at the University of Warwick in the UK.

**Senior GTA** *October 2021 - May 2023*
Responsible for teaching and demonstration of various laboratory experiments to 1st year Physics and Electronics undergraduate students at the University of Warwick in the UK

**Visiting Research Student** *January 2020 - July 2021*
Worked in this (non-remunerated) position on a research project on connecting disk chemistry to exoplanet atmospheric chemistry in the group of Dr. Liton Majumdar at National Institute of Science Education and Research in India.

**Freelance tutor in Chemistry, Mathematics and Physics** *November 2018 - March 2019*
Worked as a contractual freelance tutor in Chemistry, Mathematics and Physics for Astrea Home Tutoring in The Netherlands.

## RESEARCH PROJECTS

**High resolution spectroscopy of sub-Jovian exoplanets**
*Supervisor: Dr. Matteo Brogi, University of Turin & Dr. Peter Wheatley, University of Warwick*

- Built my own Python pipeline to analyse high resolution spectroscopic data from ground-based spectrographs (`Upamana`)
- Built an end-to-end SNR simulator to simulate realistic observations from various ground-based spectrographs around the planet (`Ratri`)

**Connecting disk chemistry with exoplanet atmosphere composition**
*Supervisor: Dr. Liton Majumdar, National Institute of Science Education and Research*

- Built my own Python pipeline to connect the output of the disequilibrium chemistry code `VULCAN` to the radiative transfer code `petitRADTRANS` in order to examine how the atmospheric spectra would change with formation of a Hot-Jupiter at various positions of a protoplanetary disc.
- Examined the possibility of such differences being observed using JWST through `pandexo` simulations.

**Building planets around low mass stars**
*Supervisor: Dr. Yamila Miguel, Leiden Observatory*

- Built my own Python pipeline to construct a population synthesis framework incorporating the pebble accretion model for planetary mass growth and formation near the water iceline

**Evidence of grain growth at the outer disk-inner envelope interface of TMC1A**
*Supervisor: Dr. Michiel Hogerheijde, Dr. Daniel Harsono & Dr. Ewine van Dishoeck, Leiden Observatory*

- Used the multifrequency `clean` and `tclean` routines in `CASA` to image a Young Stellar Object called TMC1A in the Taurus Molecular Cloud and constrained various disc properties.

**X-ray emission from Kepler 63, Kepler 210 and Wasp 19**
*Supervisor: Dr. Lalitha Sairam, Indian Institute of Astrophysics*

- Looked at the high energy environment around these host stars using software available from NASA HEASARC
- Quantitatively estimated the atmospheric mass loss rate of closest exoplanets around the host stars using an energy limited approximation, and then evaluated the total mass loss over the age of the planetary system.

## LIST OF PAPERS

### Published

- **Dash, Spandan**, Matteo Brogi, Siddharth Gandhi, Marina Lafarga, Annabella Meech, Aaron Bello-Arufe, and Peter J. Wheatley. "Constraints on atmospheric water abundance and cloud deck pressure in the warm Neptune GJ 3470 b via CARMENES transmission spectroscopy." Monthly Notices of the Royal Astronomical Society 530, no. 3 (2024): 3100-3116.
- **Dash, Spandan**, Liton Majumdar, Karen Willacy, Shang-Min Tsai, Neal Turner, P. B. Rimmer, Murthy S. Gudipati, Wladimir Lyra, and Anil Bhardwaj. "Linking atmospheric chemistry of the hot Jupiter HD 209458b to its formation location through infrared transmission and emission spectra." The Astrophysical Journal 932, no. 1 (2022): 20.
- **Dash, Spandan**, and Yamila Miguel. "Planet formation and disc mass dependence in a pebble-driven scenario for low-mass stars." Monthly Notices of the Royal Astronomical Society 499, no. 3 (2020): 3510-3521.
- Lalitha, Sairam, J. H. M. M. Schmitt, and **Spandan Dash**. "Atmospheric mass-loss of extrasolar planets orbiting magnetically active host stars." Monthly Notices of the Royal Astronomical Society 477, no. 1 (2018): 808-815.

### In Review

- **Dash, Spandan**, Matteo Brogi, Fabian Seidler, Paolo Angelo Sossi, Siddharth Gandhi, Marina Lafarga, Vatsal Panwar, and Peter J. Wheatley. "Detectability of oxygen fugacity regimes in the magma ocean world 55 Cancri e at high spectral resolution" *Submitted to MNRAS*

## CONFERENCES WITH PRESENTATIONS AND SEMINARS GIVEN

- Attended the Exoplanets V conference at Leiden, The Netherlands in June 2024 - Poster presented
- Attended the UK Exoplanet Meeting 2024 (UKEXOM 2024) at University of Birmingham, United Kingdom in April 2024 - Talk given
- Attended the UK Exoplanet Meeting 2023 (UKEXOM 2023) at University College London, United Kingdom in August 2023 - Poster presented
- Attended the Exoclimes VI conference at University of Exeter, United Kingdom in June 2023 - Poster presented
- Attended the Planet ESLAB 2023 at ESTEC, The Netherlands in March 2023 - ePoster presented
- Attended the Royal Astronomical Society Meeting on High Resolution Spectroscopy of exoplanet atmospheres at Northampton, United Kingdom in February 2023 - Poster presented
- Gave a seminar at the National Institute of Science Education and Research (NISER), India on January 4, 2023 on the topic "Towards probing the atmospheres of colder Neptunes with High-Resolution transit spectroscopy"
- Attended the UK Exoplanet Meeting (UKEXOM) at University of Edinburgh, United Kingdom in September 2022 - Talk given
- Attended the Thinkshop on High Resolution Spectroscopy of exoplanet atmospheres at Leibniz Institute for Astrophysics Potsdam (AIP), Germany in September 2022 - Talk given
- Attended the National Astronomical Meeting (NAM) at University of Warwick, United Kingdom in July 2022 - Poster presented
- Attended the Annual meeting of the European Astronomical Society (EAS) at Valencia, Spain in June 2022 - ePoster presented
- Presented a webinar on July 15, 2020 in collaboration with the Department of Electrical Engineering at CCET, Bhilai on 'A Beginner's Intro to Data Analysis'.

- Attended the 35th Annual Meeting of the Astronomical Society of India conducted at Jaipur from May 5-10, 2017 + poster presentation on *Mass loss from exoplanets around low mass stars.*

## ACADEMIC ACHIEVEMENTS

- Awarded the highly competitive **Chancellor's International Scholarship** by University of Warwick to pursue a fully funded PhD position at the same institution.
- Got a **studentship from Leiden Observatory** which waived my tuition fee till home fee.
- Completed the **Blue Marble Space Institute of Science Young Scientist Programme (BMSIS YSP)** in 2017. Part of completing it resulted in publication of a popular science article as well[1].
- Selected for the **Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship** (a now discontinued fellowship programme set up by the Government of India to encourage research in Basic Sciences) in 2012 by securing All India Rank of 267.

## EXTRA-ACADEMIC WORK AND OUTREACH

- Was convener of the Stellar-Exoplanet atmospheres group meetings conducted weekly at University of Warwick (2022-2025).
- Was convener of the joint Oxford-Warwick High Resolution Spectroscopy group meetings (2022-2025).
- Have maintained my Quora[2] profile to answer questions about Astrobiology, Astronomy and Planetary Science research, as well as about going into a Basic Science with research pathway in India for undergraduate and after. I also have had school and college level interaction sessions regarding the same and answered interested people's questions both offline and online.

## LANGUAGES KNOWN

English (Proficient), Hindi (Fluent), Odia (Mother Tongue)

## ACADEMIC REFERRERS WHO CAN BE CONTACTED

- Dr. Matteo Brogi - University of Turin, Italy - matteo.brogi@unito.it - +39 011 670 7261
- Dr. Peter Wheatley - University of Warwick, UK - p.j.wheatley@warwick.ac.uk - +44 247 657 4330
- Dr. Liton Majumdar - NISER, India - liton@niser.ac.in - +91 674 249 4482

[1] https://sciworthy.com/how-to-set-up-a-martian-government/
[2] https://www.quora.com/profile/Spandan-Dash