

# Ankur Dev

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## Education

**Ph.D. (Dr. rer. nat.) candidate in Astronomy & Astrophysics** 2020 - Present

**University of Bonn, Germany**

*Thesis: End-to-End Simulation and Data Reduction for the Spectrometer and Continuum Instruments of CCAT.*

*Advisor: Prof. Frank Bertoldi*

**M.Sc in Astrophysics** 2016 - 2020

**Queen Mary University of London, UK**

*First Class Honours (A grade in all modules)*

*Thesis: Hydrogen Epoch of Reionization Array Experiment: Effect of Radio Frequency Interference Excision on 21-cm Power Spectrum.*

*Advisor: Dr. Phil Bull*

**B.Tech in Electrical and Electronics Engineering** 2012 - 2016

**Manipal University, Manipal Institute of Technology, India**

## Research Interests

Line-intensity mapping ([CII], CO, 21-cm); cosmic large-scale structure; Epoch of Reionization; data reduction and analysis, map-making, systematics (atmosphere, scanning, noise, RFI) modeling; Cosmic Microwave Background (CMB) observables; Sunyaev–Zel’dovich (SZ) effect.

## Research Experience

**Doctoral student (Advisor: Prof. Frank Bertoldi), University of Bonn, Germany** 2020 - present

- Developed end-to-end Epoch of Reionization Spectrometer (EoR-Spec) simulations for systematics and map-making
- Leading the implementation of the CCAT/FYST continuum camera data-reduction and map-making pipeline
- Integrating the map-making pipelines with the CCAT data-center, and performing HPC scaling tests
- Observed and reduced NIKA2/IRAM-30 m data of a triple-merger cluster at  $z = 0.36$  to measure the SZ signal

**Masters student (Advisor: Dr. Phil Bull), Queen Mary University of London, UK** 2019 - 2020

Investigated the impact of radio-frequency interference (RFI) excision on the 21-cm LIM power spectrum for the Hydrogen Epoch of Reionization Array (HERA) experiment.

**SEPnet summer intern (Advisor: Prof. Daniel J. B. Smith)** 2018 & 2019

**University of Hertfordshire, UK**

Developed an algorithm to estimate spectroscopic redshifts for emission-line galaxies in the WEAVE-LOFAR multi-object spectroscopic survey. Subsequently improved the algorithm using template cross-correlation with galaxy spectra to recover reliable redshifts missed by other methods.

**Undergraduate student researcher, Manipal Institute of Technology, India** 2012 - 2015

Worked as Systems Engineer and electric power sub-system member in a student nano-satellite project under the guidance of Indian Space Research Organisation (ISRO). Contributed as team lead to systems integration and circuit design for the electric power sub-system.

## Collaboration Membership

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<b>CCAT Collaboration</b>	2020 - present
<ul style="list-style-type: none"><li>• Leading map-making and data-reduction pipeline implementation for FYST</li><li>• Contributed to scan strategies working group with simulations</li><li>• Collaborating in Line Intensity Mapping science working group</li></ul>	
<b>International Max Planck Research School for Astronomy and Astrophysics</b>	2020 - present
IMPRS Bonn & Cologne	
Contributed to student seminars and participated in researcher training workshops	
<b>Collaborative Research Center CRC 1601 (Bonn – Cologne)</b>	2023 - present
Contributing to project <i>C3 Tomography of cosmic reionisation and large-scale structure of the Universe at redshifts 3 - 8</i> , as part of doctoral thesis work	
<b>Collaborative Research Center CRC 956 (Bonn – Cologne)</b>	2020 - 2022
<b>ESA Medium-class M7 space mission proposing team</b>	2022
Contributed to LISZT <i>The Line Intensity and SZ Tomography Space mission</i> proposal work (* not selected)	

## Tutoring & Mentoring

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<b>AstroSem course, University of Bonn</b>	2023 - 2024
Mentored masters students in a Seminar course on Astronomy and Astrophysics, where they presented talks based on recently published research papers.	
<ul style="list-style-type: none"><li>• Reihaneh Javadi (2024 Summer semester)</li><li>• Helene Kast (2023 Winter semester)</li><li>• Kamalpreet Kaur (2023 Summer semester)</li></ul>	
<b>Radio astronomy Lab course, University of Bonn</b>	2021 - 2025
<ul style="list-style-type: none"><li>• In charge of the Radio Astronomy Laboratory Course, responsible for tutoring and grading over 60 Masters student groups.</li><li>• Lead and secured two QV-Mittel (Quality Improvement) grants (~ € 500 each, 2024 &amp; 2025) for lab upgrades and maintenance.</li><li>• Set up and integrated a three-element radio interferometer now used for student training, and gained extensive experience in electronics, coordination, lab manual preparation, and tutoring.</li></ul>	
<b>Mathematics &amp; Physics Tutor, Boost Education, London</b>	2017 - 2018
Mentored school students aged 11–16 years, providing academic support in mathematics and physics.	

## Skills

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<b>Computing</b>	PYTHON, C++, LINUX/UNIX, High-Performance Computing (HPC) with SLURM, multi-node scaling, parallel processing, Git version control, Environment management, Apptainer/Singularity
<b>Analysis</b>	mm/sub-mm telescope data reduction, map-making, astronomical software packages (sotodlib, toast, astropy, healpy, pysm3, pixell, ...), large dataset handling (FITS, HDF5, SPT3G file formats), data analysis (numpy, scipy, pandas, matplotlib, seaborn, scikit-learn, pytorch, ...), DS9, GQRX (software-defined radio)
<b>Professional</b>	Academic research, scientific writing, $\text{\LaTeX}$ , teaching and tutoring, supervision
<b>Languages</b>	English (Expert), German (Intermediate), Native: Assamese, Bengali, Hindi

## Observing

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### Successful Proposals as co-PI

- *Intensity mapping the integrated CII line emission at 400 GHz*  
78 hr total allocated

ALMA Cycle 12 – Project No. 2025.1.01466.S (PI: Dr. Christos Karoumpis)

ALMA Cycle 11 – Project No. 2024.1.01629.S (PI: Dr. Christos Karoumpis)

- *Deep tSZ and kSZ imaging of a triple-merger system within a supercluster*  
43 hr total allocated  
IRAM-30m NIKA2 Summer pool 2021 – Project No. 085-21 (PI: Dr. Kaustuv Basu)

## Observational Experience

Remote observer for 17 shifts (3 hr each) at IRAM-30m telescope during NIKA2 Winter (2020) and Summer (2021) science observation runs. Gained experience with bolometer camera and telescope operations, including sky-dips, calibration scans, and making beam maps.

## Awards, Honours & Scholarships

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- **International Science and Engineering Excellence Award, Queen Mary University of London (2016–2020):** £ 5000/year scholarship for academic excellence.
- **PhD position offer (2019, declined):** University of Cambridge (Selwyn College)
- **Annual Fund Scholarship, Queen Mary University of London (2018):** £ 500 award for outstanding academic progress.
- **2<sup>nd</sup> Prize, Poster Presentation, UK South-East Physics Network (SEPnet) Expo (2018):** *Obtaining Redshifts for Emission-line Dominated Sources in the WEAVE-LOFAR Survey.*
- **Certificate of Merit, CBSE India (2009):** Top 0.1% nation-wide in Mathematics and Science.
- **1<sup>st</sup> Prize, All Assam Mathematics Talent Search Examination (2006):** state-wide mathematics olympiad.

## Scientific Presentations

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### Contributed Talks

- *Line Intensity Mapping 2025 – LAPTh, Annecy, France* 2025
- *The multi-color Universe - A new era with LIM – Heidelberg University, Germany* 2024
- *Line Intensity Mapping 2024 – NCSA, University of Illinois at Urbana-Champaign, US* 2024
- *CS & Physics Meet-Up by Lamarr & B3D – Lamarr Institut, TU Dortmund University, Germany* 2023
- *Present and Future of Line-Intensity Mapping – MPA, Garching, Germany* 2023

### Informal Presentations

- *Annual CCAT Collaboration Meetings, CCM 3 – 6* 2022 - 2025
- *CRC 1601 student seminar, PhI, University of Cologne, Germany* 2024
- *Galaxy Lunch Seminar (online) – Astronomy Department, Cornell University, US* 2023
- *IMPRS Bonn & Cologne student conference – MPIfR, Bonn, Germany* 2023
- *(\* Poster Presentation) UK South-East Physics Network (SEPnet) Expo – London, UK* 2018, 2019

## Community & Outreach

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- *Instructor for visiting school students, AlfA University of Bonn, Germany* 2025
- *Invited Speaker: Pint of Science Bonn, Germany* 2025
- *Invited Speaker: Astronomy on Tap Bonn, Germany* 2023, (\* 2026 scheduled)
- *Event Organiser: Astroclub, AlfA University of Bonn, Germany* 2022 - 2024
- *Led several outreach events, including night-sky and eclipse observations, for students and the local community.*

## Publication List

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### Journal Articles

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- CCAT-Prime Collaboration (Dec. 2022). CCAT-prime Collaboration: Science Goals and Forecasts with Prime-Cam on the Fred Young Submillimeter Telescope. In: *The Astrophysical Journal Supplement Series* 264.1, p. 7. doi: [10.3847/1538-4365/ac9838](https://doi.org/10.3847/1538-4365/ac9838).
- J. Clarke, C. Karoumpis, D. Riechers, B. Magnelli, Y. Okada, **A. Dev**, T. Nikola, F. Bertoldi (Sept. 2024). [CII] luminosity models and large-scale image cubes based on COSMOS 2020 and ALPINE-ALMA [CII] data back to the epoch of reionisation. In: *Astronomy & Astrophysics* 689, A101. doi: [10.1051/0004-6361/202450300](https://doi.org/10.1051/0004-6361/202450300).
- C. Karoumpis, B. Magnelli, E. Romano-Díaz, K. Garcia, **A. Dev**, J. Clarke, T.-M. Wang, T. Bădescu, D. Riechers, F. Bertoldi (Nov. 2024). [CII] line intensity mapping the epoch of reionization with the Prime-Cam on FYST: II. CO foreground masking based on an external catalog. In: *Astronomy & Astrophysics* 691, A262. doi: [10.1051/0004-6361/202450304](https://doi.org/10.1051/0004-6361/202450304).

### Other Publications

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- K. Sukumar, K. Kinger, T. John, **A. Dev**, K. Shashank (Mar. 2016). Adaptive fault tolerant architecture for enhanced reliability of small satellites. In: *2016 IEEE Aerospace Conference*. IEEE, pp. 1–7. doi: [10.1109/aero.2016.7500609](https://doi.org/10.1109/aero.2016.7500609).