PRANAV LIMAYE

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EDUCATION

- **Masters in Science Astrophysics** ***October 2021 – March 2025***
  Argelander Institute for Astronomy, University of Bonn

  Master's Thesis ***March 2024 – March 2025***
  Project – A Statistical Study of the Active Repeating Fast Radio Burst FRB 20240114A with the Effelsberg 100-m Radio Telescope.
  Supervisor – Dr. Laura Spitler, Prof. Dr. Michael Kramer, *Max Planck Institute for Radio Astronomy, Bonn, Germany*
  Description – The thesis focuses on an observational study of the hyperactive repeater FRB 20240114A using the Ultra BroadBand receiver (1.3–6 GHz) on the Effelsberg 100-m Radio Telescope. This one-year project involved conducting observations, processing high time-resolution radio datasets, data analysis, and scientific interpretation. The project resulted in the highest-frequency detection of FRB 20240114A (ATel #16620).
  Grade (Italian equivalent): 30 e lode

- **Bachelors in Science Physics** ***June 2018 – June 2021***
  University of Pune

  Undergraduate Thesis ***January 2021 – June 2021***
  Project – Study of GMRT Beam-Steering Capability Using Pulsar Observations.
  Supervisor – Prof. Dr. Yashwant Gupta, *National Center for Radio Astrophysics*
  Description – This six-month project aimed to study the response of the electronic beamformer of the Giant Meterwave Radio Telescope (GMRT) by processing and analyzing observations of the bright pulsar PSR B0329+54 at varying offsets from the source position.
  Grade (Italian equivalent): 30 e lode

RESEARCH INTERESTS

Fast Radio Bursts — Neutron Stars — Supernova remnants — Stellar Evolution — High Energy Astrophysics — Statistical Astrophysics — Observational Astronomy — Data-Intensive Astronomy — Telescope Instrumentation

RESEARCH EXPERIENCE

Masters Internships

- **Neutron Star-FRB connection through pulsar single pulse studies** ***October 2022 - March 2023***
  Supervisor - Prof. Marilyn Cruces, Prof. Dr. Michael Kramer, *Max Planck Institute for Radio Astronomy, Bonn, Germany*
  Description - The aim of this internship was to establish a connection between neutron stars and FRBs through observational study of pulsar single pulses. This involved developing a single pulse search pipeline and statistical study of pulsar single pulse energy distributions. The internship also resulted in writing a successful observing proposal and conducting observations for the scope of this work.

- **Verification and implementation of polyphase filterbanks** ***April 2022 - June 2022***
  Supervisor - Gerrit Fabian Grutzeck, Prof. Dr. Bernd Klein, *Max Planck Institute for Radio Astronomy, Bonn, Germany*
  Description - The focus of this internship was to simulate and verify the response of polyphase filterbanks using the Python programming language. This involved making Python functions to simulate filter responses as well as a literature study of polyphase filterbank implementation on FPGA programming boards.

Undergraduate Projects

- **SWAN Antenna Design Challenge** ***May 2020***
  Project - Implementation of a novel antenna design for radio astronomical applications
  Supervisor - Dr. Avinash Deshpande, *Raman Research Institute, Banglore, India*

Description - The aim of this project was to simulate a novel antenna design for broad bandwidth coverage from 50-500 MHz. This was conducted as a group project, wherein I contributed in optimizing the antenna simulations and constructing the final prototype.

- **Green Bank 20-m Telescope Observations** ***August 2020***
  Project - Observations of HI line emission using the GBT 20-m Radio Telescope
  Supervisor - Luci Finucan, *Green Bank Observatory, West Virginia, USA*
  Description - Gained hands-on experience in conducting remote astronomical observations. The Milky Way galactic plane was observed targeting HI spectral line emission. The recorded data was then processed and the HI line spectra from different parts of the galactic plane were analysed to infer the galactic rotation curve of the galaxy.

- **Earth, Atmospheric and Space Technologies** ***October 2019 - November 2019***
  Project - Aerosol density distribution in Earth's atmosphere
  Supervisor - Dr. Pratibha Mane, *Shivaji University, Kolhapur, India*
  Description - Observational data from a twilight photometer was used to study the distribution of aerosols in different layers of the Earth's atmosphere. A literature review was further conducted to study correlations between aerosol distribution and earthquakes.

RESEARCH PUBLICATIONS

- Broadband detection of bursts from FRB 20240114A up to 6GHz using the Effelsberg 100-m Telescope **(Limaye, P. & Spitler, L. 2024, The Astronomer's Telegram)**
- A Broadband view of the Active Repeating Fast Radio Burst FRB20240114A with the Effelsberg 100-m Radio Telescope **(Limaye et al., in prep)**
- Single Pulse Studies of PSR B0329+54 and PSR B0355+54 and their implications for Fast Radio Bursts **(Limaye et al., in prep)**
- Constraints on the X-ray-to-radio fluence ratio of FRB 20240114A **(Eppel, Krumpe, Limaye et al. 2025)**
- First Swift Observations of the Repeating FRB20240114A **(Verrecchia, F Incl. Limaye et al, 2024, The Astronomer's Telegram)**
- FRB 20121102A monitoring: updated periodicity at L-band **(Braga Incl. Limaye et al. 2024)**
- Observing radio transients with Phased ALMA: Pulses from the Galactic Centre Magnetar **(J. Vera-Casanova Incl. Limaye et al. 2025)**

ACCEPTED OBSERVING PROPOSALS

- Pulsar-FRB Connection : Investigating Single Pulse Energies using Effelsberg 100-m Radio Telescope (PI: Pranav Limaye)
- High Frequency Follow-up of FRB20240114A with the Sardinia Radio Telescope (PI: Pranav Limaye)
- Multi-wavelength Constraints on FRB20240114A with Effelsberg and XMM-Newton (PI: Florian Eppel)
- Continuing Ultra Broadband observations of FRB20180916B (with Effelsberg) (PI: Suryarao Bethapudi)
- Measuring fast radio burst spectra using regular monitoring with the UBB (with Effelsberg) (PI: Dr. Laura Spilter)
- Can magnetars in complex environments explain the origin of Fast Radio Bursts? (using ALMA) (PI: Prof. Marilyn Cruces)
- The Northern High Time Resolution Universe Single Pulse search candidate follow-up (PI: Leon Houben)
- ALMA-Effelsberg follow-up of magnetars in complex environments (PI: Prof. Marilyn Cruces)

WORKSHOPS AND CONFERENCES

- **Fast Radio Burst (FRB) Conference 2025** ***07-11 July 2025***
  Mcgill University, Montreal , QC (Attended Virtually)

- 18^{th} **Bonn Neutron Star Workshop** ***08-09 May 2025***
  University of Cologne, Cologne, Germany
  Contribution - Presented a talk on "A broadband study of FRB 20240114A with the Effelsberg 100-m Radio Telescope".
  Contribution - Presented a poster on "Probing the FRB-Neutron Star connection through pulsar single pulse studies ".

- **Annual Meeting of the Astronomische Gesellschaft** ***09-13 September 2024***
  University of Cologne, Cologne, Germany
  Contribution - Presented a talk on "Statistical Study of active repeating Fast Radio Bursts with the Effelsberg 100-m Radio Telescope".

- **Basic Deep Learning Workshop** ***13 June 2024***
  University of Cologne, Cologne, Germany

- 17^{th} **Bonn Neutron Star Workshop** ***16-17 May 2024***
  MPIfR, Bonn, Germany

- **Timing and Imaging of compact sources with SKA pathfinders and precursors** ***12-18 June 2023***
  Kerastari, Greece
  Contribution - Presented a poster on "Pulsar-FRB Connection: Investigating single pulse energies"

- **CASA VLBI Workshop** ***05-09 June 2023***
  ASTRON, Dwingeloo, The Netherlands

- **Invited Talk** ***04 May 2023***
  AstroLab Research Group, University of Chile, Chile (Virtual)
  Contribution - Presented a talk on "Finding a Connection between Fast Radio Bursts and Neutron Stars"

- 16^{th} **Bonn Neutron Star Workshop** ***19-20 April 2023***
  MPIfR, Bonn, Germany

- 19^{th} **European Radio Interferometry School** ***19-23 September 2022***
  JIVE-ASTRON, Dwingeloo, The Netherlands

- **VLA Sky Survey Conference** ***07-09 September 2022***
  (Attended Virtually)
  Contribution - Presented a poster on "VLA Sky Survey in the era of discovering exotic transients/variables"

- 8^{th} **Annual Science at Low Frequencies Conference** ***06-09 December 2021***
  (Attended Virtually)
  Contribution - Presented a talk on "Analysis of Arecibo Observations of Pulsar B1859+07"

- **International Pulsar Timing Array Student Workshop and Conference** ***14-25 June 2021***
  (Attended Virtually)

- **Radio Astronomy Winter School** ***28 December 2020 -09 January 2021***
  NCRA-IUCAA, Pune, India (Attended Virtually)

- **Wider and Deeper at Green Bank: The New Argus-144 instrument** ***22-24 September 2021***
  Green Bank Observatory, West Virginia, USA (Attended Virtually)
  Contribution - Presented a poster on "Astronomy at 3-millimeter wavelength"

WORK EXPERIENCE

- **Research Assistant** ***April 2025 - September 2025***
  Supervisor - Prof. Dr. Frank Bertoldi, *Argelander Institute for Astronomy, University of Bonn, Germany*
  Description - In this role, my goal is to design and set up a radio astronomy lab and experiments that spark interest among high school students through engaging, short-term research projects.

- **Research Assistant** ***April 2025 - July 2025***
  Supervisor - Dr. Ewan Barr, *Max Planck Institute for Radio Astronomy, Bonn, Germany*
  Description - The goal of this job is to develop an interactive web interface that visualizes TransientX search outputs from the Effelsberg 100-m Radio Telescope, enabling real-time monitoring and archival logging of transient observations. (View Project)

- **Research Assistant** ***October 2024 - March 2025***
  Supervisor - Prof. Dr. Frank Bertoldi, *Argelander Institute for Astronomy, University of Bonn, Germany*
  Description - The goal of this job was to assist in structuring the 'NRW Netzwerk Proposal'. My responsibility in this work was to suggest projects and collaborations to be included in the proposal and documenting the proposal literature.

- **Research Assistant** ***September 2023 - March 2025***
  Supervisor - Prof. Dr. Michael Kramer, *Max Planck Institute for Radio Astronomy, Bonn, Germany*
  Description - The responsibilities of this job were to process archival continuum and spectral line data from the Effelsberg 100-m Radio Telescope and convert them into the widely used FITS data format. A part of this work also involved preparing open access data for citizen science within the PUNCH4NFDI Consortium.

- **Research Assistant with tutoring duties** ***January 2023 - March 2025***
  Supervisor - Prof. Dr. Frank Bertoldi, *Argelander Institute for Astronomy, University of Bonn, Germany*
  Description - Tutor for the Radio Astronomy Lab Course over four consecutive semesters, teaching students about radio astronomical receivers, radio interferometry using the twin interferometers of Argelander Institute for Astronomy, and guiding them in conducting observations of the Sun.

- **Research Assistant** ***December 2022 - August 2023***
  Supervisor - Dr. Helge Rottmann, *Max Planck Institute for Radio Astronomy, Bonn, Germany*
  Description - The goal of this job was to record VLBI observations on the MPIfR Bonn correlator and handle the logistics of VLBI data recording modules.

SKILLS

- **Softwares** - PSRCHIVE, TransientX, CASA, GitHub, LaTeX, MS Office, OriginLab, FEKO, WIPL-D
- **Programming** - Python, Bash, Arduino IDE, gnuplot
- **Operating Systems** - Linux, Windows
- **Languages** - English (Fluent), Hindi (Native), Marathi (Native), German (Beginner)

ROLES AND VOLUNTEERING EXPERIENCE

- **Member: Local Organising Committee** - 18^{th} Bonn Neutron Star Workshop ***February 2025 - May 2025***
- **Mentor** - Seminar on Astronomy and Astrophysics (astro830) ***April 2024 - June 2024***
- **Member: Local Organising Committee** - 17^{th} Bonn Neutron Star Workshop ***February 2024 - May 2024***
- **Member: Local Organising Committee** - 16^{th} Bonn Neutron Star Workshop ***Jaunary 2023 - April 2023***
- **Volunteer** - Astronomy on Tap Bonn ***2023 - Present***
- **Volunteer** - Universe on Tour, Bonn ***August 2023***
- **Member** - Astronomy Club, Fergusson College, Pune ***June 2018 - June 2021***

REFEREES

- **Dr. Laura Spitler**
  Scientific Staff
  Group: Fundamental Physics in Radio Astronomy, Max Planck Institute for Radio Astronomy
  Email: `lspitler@mpifr-bonn.mpg.de`
  Phone: tel:+49(0)228-525-147
  Relationship: Master's Thesis Supervisor