Anjana Ashok

NANOGrav PFC Post Doc
Oregon State University,
Corvallis, Oregon, USA
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Professional

Oregon State University — Corvallis, Oregon, USA
NANOGrav PFC Post Doctoral Fellow, Pulsar Timing Arrays — Apr 2025 –Present

- Data analysis aspects of Pulsar Timing Arrays (PTAs).
- Methods to improve Continuous Gravitational Wave Detection in PTAs, Independent Project
- Analysis of intrinsic pulsar noise in NANOGrav data, with Dr.Jeffrey Hazboun.

Max Planck Institute for Gravitational Physics — Hannover, Germany
Junior Scientist / Post-Doc, Pulsar Timing Arrays — Feb 2024 –Feb 2025

- Data analysis aspects of Pulsar Timing Arrays (PTAs).
- Methods to analyze non-stationarity in PTA signal and noise processes, with Dr.Rutger van Haasteren
- Methods for Continuous gravitational waves in PTAs, with Prof.Bruce Allen.

Max Planck Institute for Gravitational Physics — Hannover, Germany
Junior Scientist / Post-Doc, Continuous Gravitational Waves — May 2023–Jan 2024

- Targeted searches for continuous gravitational waves
- Development and deployment of a new Bayesian method for searches for continuous gravitational waves in LIGO data, with Dr.Pep Covas, Dr.Reinhard Prix and Prof.Dr.Maria Alessandra Papa
- Gravitational wave follow up of newly discovered pulsars, with Prof.Dr.Maria Alessandra Papa and Dr.Colin Clark

Education

Max Planck Institute for Gravitational Physics — Hannover, Germany
Ph.D. Studies under the supervision of Prof.Dr.Maria Alessandra Papa,
Degree awarded by Leibniz Universität Hannover — October 2018–May 2023

- Thesis: "Targeted searches for continuous gravitational waves"
- Dissertation: Sehr-Gut (Magna cum Laude)
  Disputation : Ausgezeichnet (Summa cum Laude)
  Overall : Sehr-Gut (Magna cum Laude)

National Institute of Technology — Karnataka, India
M.Sc. in Physics — 07-2015–05-2017

- Thesis: "Einstein's Gravity, Generation of gravitational waves and an introduction to Post-Newtonian Approximation"
- CGPA: 9.17/10.00

University of Calicut — Kerala, India
B.Sc. in Physics, Minor in Mathematics and Chemistry — 06-2012–05-2015

- Thesis: "Superheated drop detectors and PICO dark matter search experiment"
- Core Course (Physics) CGPA: 3.88/4.00
  Overall CGPA: 3.77/4.00

Central Board of Secondary Education India
Senior School 06-2010–03-2012

- Subjects: Physics, Chemistry, Mathematics, Computer Science (C++), English
- Overall Percentage: 91.8%, Science+CS: 95%

Central Board of Secondary Education India
High School –03-2010

- Subjects: Science, Mathematics, Social Science, Sanskrit, English
- CGPA: 10.0/10.0

Research Experience

Indian Institute of Space Science and Technology Trivandrum, India
Junior Research Fellow 01-2018–06-2018

- Radio afterglows of gamma ray bursts
- Analysis of GMRT observations of the afterglow and host-galaxy properties of GRB171205A, with Dr.Resmi Leskhmi

Inter University Centre for Astronomy and Astrophysics Pune, India
Short term project 08-2017–11-2017

- Gravitational wave data analysis techniques
- χ^2 tests to differentiate between signals and detector glitches in Advanced LIGO data, with Prof. Sanjeev Dhurandhar and Prof. Sukanta Bose

Saha Institute of Nuclear Physics Kolkata, India
Undergraduate Associateship Programme 01-01-2015–30-01-2015

- High energy nuclear and particle physics
- Relativistic Heavy Ion Collisions, Quark Gluon Plasma, HBT Interferometry and the Large Hadron Collider, under Dr.Debasish Das

Saha Institute of Nuclear Physics Kolkata, India
Undergraduate Associateship Programme 01-04-2014–21-05-2014

- Astroparticle physics
- Superheated drop detectors and the PICO dark matter search experiment, under Prof.Mala Das

Publications

[1] C. J. Clark *et al.*, "Einstein@Home Searches for Gamma-ray Pulsars in the Inner Galaxy", Sep. 2025. arXiv: 2509.21307 [astro-ph.HE].

[2] A. Ashok, P. B. Covas, R. Prix, and M. A. Papa, "Bayesian $\mathcal{F}$-statistic-based parameter estimation of continuous gravitational waves from known pulsars", *Phys. Rev. D*, vol. 109, p. 104 002, 10 May 2024. arXiv: 2401.17025 [gr-qc].

[3] A. de Ugarte Postigo *et al.*, "HI and CO spectroscopy of the unusual host of GRB 171205A: A grand design spiral galaxy with a distorted HI field", Jun. 2024. arXiv: 2406.16726 [astro-ph.HE].

[4] A. Ashok, "Targeted searches for continuous gravitational waves", Ph.D. dissertation, Leibniz U., Hannover, 2023. eprint: https://repo.uni-hannover.de/items/bf8caecf-a655-4467-994b-6561f186cbd2.

[5] C. J. Clark *et al.*, "The TRAPUM L-band survey for pulsars in Fermi-LAT gamma-ray sources", *Mon. Not. Roy. Astron. Soc.*, vol. 519, no. 4, pp. 5590–5606, 2023. arXiv: 2212.08528 [astro-ph.HE].

[6] A. Ashok, B. Beheshtipour, M. A. Papa, P. C. C. Freire, B. Steltner, B. Machenschalk, O. Behnke, B. Allen, and R. Prix, "New Searches for Continuous Gravitational Waves from Seven Fast Pulsars", *Astrophys. J.*, vol. 923, no. 1, p. 85, 2021. arXiv: 2107.09727 [astro-ph.HE].

[7] L. Nieder *et al.*, "Discovery of a Gamma-ray Black Widow Pulsar by GPU-accelerated Einstein@Home", *Astrophys. J. Lett.*, vol. 902, no. 2, p. L46, 2020. arXiv: 2009.01513 [astro-ph.HE].

Talks, Conferences

- **Oregon Astronomy Research Symposium**
  University of Oregon, Eugene, Oregon, USA — September 2025
  Contributed Talk
- **Astronomy on Tap**
  Corvallis, Oregon, USA — September 2025
  Popular Science Talk
- **International Pulsar Timing Array (IPTA) Meeting 2025**
  Caltech & Pasadena, USA — June 2025
  Lightning Talk
- **DSA2000 Monthly Community Meeting**
  Online — May 2025
  Contributed Talk
- **17th Marcel Grossmann Meeting 2024**
  Pescara, Italy — July 2024
  Contributed Talk
- **International Pulsar Timing Array (IPTA) Meeting 2024**
  Milan & Sesto, Italy — June 2024
  Poster
- **APS April Meeting 2024**
  Sacramento, California — April 2024
  Contributed Talk
- **Die Nacht, die Wissen schafft**
  Max Planck Institute for Gravitational Physics, Hannover, Germany — November 2023
  Popular Science Talk
- **Multi-Messenger Continuous Gravitational Waves Workshop**
  Nikhef, Amsterdam — July 2023
  Contributed Talk
- **International Pulsar Timing Array (IPTA) Meeting 2023**
  CSIRO & OzGrav, Australia,
  Student Workshop and Science Meeting — June 2023
  Attendee, Sparkler Talk
- 16^{th} **Bonn Neutron Star Workshop**
  Max Planck Institute for Radioastronomy, Germany — April 2023
  Contributed Talk
- **Gravitational Wave Physics and Astronomy Workshop (GWPAW)**
  OzGrav, Melbourne, Australia — December 2022
  Poster
- **Gravitational Wave Physics and Astronomy Workshop (GWPAW)**
  Hannover, Germany — December 2021
  Poster

- **Annual Meeting of German Astronomical Society**
  online September 2021
  Contributed Talk
- **International Max Planck Research School on Gravitational Wave Astronomy (IMPRS)**
  Lecture Weeks, Scientific Training Activities 2018-2022
  PhD Student Participant

Technical Skills

- **Programming Languages:**
  - **Python:** Developed and maintained pipelines for Advanced LIGO data analysis for continuous gravitational waves from known pulsars. Developed and rigorously tested a new parameter-estimation methodology.
  - **C:** Proficient in code analysis and debugging and writing original code.
- **Data Visualization:**
  - Proficient in using Python and MATLAB for scientific data visualization and interpretation.
- **Data Analysis Software:**
  - **LALSuite, BILBY:** Experienced in employing specialized software packages for gravitational wave data analysis. And applying tools picked up from one problem to another.
  - **Enterprise, Enterprise-Extensions etc:** Experienced in employing specialized software packages for Pulsar Timing Array data analysis.
- **High-Performance Computing (HPC):**
  - Experienced user of the ATLAS-cluster at AEI-Hannover and HTCondor systems for managing and executing large-scale computational tasks.
- **Operating Systems:**
  - Proficient in both Linux and MacOS environments.
- **Version Control:**
  - Git

Additional Responsibilities

- **Lecturer:**
  - Delivered a set of two lectures on core concepts in data analysis for Continuous Gravitational Waves at the Max Planck Institute for Gravitational Physics, Hannover, Summer 2023. These lectures served as a foundational element for initiating collaborative meetings between the CW group and the Pulsar group. Topic covered: Continuous gravitational wave emission, sources, searches, the F-statistic
- **Seminar Supervisor:**
  - Supervised Master's student seminar on 'Neutron Stars' at Gottfried Wilhelm Leibniz Universität, Hannover, Winter 2019.
  - Supervised Master's student seminar on 'Multimessenger Astronomy' at Gottfried Wilhelm Leibniz Universität, Hannover, Summer 2019.
- **Tutorial Assistant:**
  - Served as a tutorial assistant for the Master's course on the General Theory of Relativity at Gottfried Wilhelm Leibniz Universität, Hannover, Winter 2019.

Professional Services

- **Manuscript Review**
  - **Scienfitic Reports**, Nature Portfolio
- **Scientific Organizing Committee**
  - **NANOGrav Fall Meeting**, November 2025

Languages

- **English: Excellent** IELTS certified:8.5
- **German: Intermediate** B1 Goethe certified at an average of 91%
- **Malayalam:** Native

References

1. **Prof. Dr. Xavier Siemens**
   PI, NANOGrav PTA Collaboration, Professor, Department of Physics, Oregon State University
   xavier.siemens@oregonstate.edu
2. **Prof. Dr. Maria Alessandra Papa**
   Leader of the Max Planck Permanent Independent Research Group Continuous Gravitational Waves, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover
   maria.alessandra.papa@aei.mpg.de
3. **Prof. Dr. Bruce Allen**
   Director, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover
   bruce.allen@aei.mpg.de
4. **Dr. Reinhard Prix**
   Senior Scientist, Continuous Gravitational Waves, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover
   reinhard.prix@aei.mpg.de
5. **Dr. Rutger van Haasteren**
   Group Leader, Pulsar Timing Arrays, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover
   rutger.v.haasteren@aei.mpg.de
6. **Dr. Colin Clark**
   Research Group Leader, Pulsars, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover
   colin.clark@aei.mpg.de