

DR. ARITRA BASU

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CURRENT POSITIONS

Staff Astronomer, Thüringer Landessternwarte Tautenburg, Germany	2020–Present
Guest Researcher, Max-Planck-Institut für Radioastronomie Bonn, Germany (Group of Prof. Michael Kramer)	2017–Present

PREVIOUS POSITIONS

Scientific Associate, Universität Bielefeld Bielefeld, Germany (Group of Prof. Dominik J. Schwarz)	2017–2020
Post doctoral researcher, Max-Planck-Institut für Radioastronomie Bonn, Germany (Group of Prof. Michael Kramer and Dr. Sui Ann Mao)	2014–2017
CEFIPRA Post doctoral fellow, NCRA–TIFR Pune, India (Supervisor: Dr. Yogesh Wadadekar)	August 2013–May 2014

EDUCATION

Ph.D, National Centre for Radio Astrophysics (NCRA) Tata Institute of Fundamental Research (TIFR), Mumbai, India	2007–2013 (Degree: 11 th April 2014)
Master of Science (Physics), University of Pune, India	2005–2007
Bachelor of Science (Physics Honours), St. Stephen's College Delhi University, India	2002–2005

RESEARCH INTERESTS

Properties of magneto-ionic plasma in astrophysical objects • Broadband radio polarimetric studies: galactic, extragalactic and astroparticles • Interstellar and intracluster turbulence of gas and magnetic fields • Magnetic fields in high redshift objects • Foreground emission separation for cosmological studies • Multiwavelength extragalactic source characterization.

CONSORTIUM MEMBERSHIPS

2023–	<i>Project Scientist</i> of the MPIfR MeerKAT Galactic Plane Survey (3000 h with the MeerKAT).
2022–	Core member of the SKA Cosmic Magnetism science working group.
2022–	Organizing committee of the Japan-Germany collaboration on cosmology and astroparticle physics.
2021–	Chair of the Dark Matter focus group of the SKA Cosmic Magnetism science working group.
2020–	German Long Wavelength (GLOW) consortium Science Working Group.
2019–	LOFAR Magnetism and Surveys Key Science Projects (MKSP and SKSP).
2018–	Junior member of the International Astronomical Union (IAU).
2018–	Member of the German Astronomical Society (Astronomische Gesellschaft).
2017–	Member of the German D-MeerKAT consortium.
2017–	Member of the QUOCKA survey.
2017–	Member of POSSUM science working groups.
2016–2022	Associate member of the SKA Cosmic Magnetism science working group.

OBSERVING EXPERIENCE

- 2021– 70 hours of observing time with the MeerKAT as the co-PI (30 hours as the Technical Lead).
- 2017– 90 hours of observing time with the Very Long Baseline Array as the PI.
- 2015– Over 100 hours of observing time with the Karl G. Jansky Very Large Array as the PI and co-I.
- 2009– Over 300 hours of observing time with the Giant Metrewave Radio Telescope as the PI.

GRANTS AND AWARDS

- 2023 Research grant from the German Federal Ministry of Education and Research (BMBF) for the 3rd cycle of the D-MeerKAT-III consortium (with 9 German institutions).
- 2021 Research grant from the Japan Society for the Promotion of Science (JSPS-KAKENHI) on “*Axion dark matter search from world’s largest radio telescope SKA*”.
[Co-applicant with PI Dr. Yuko Urakawa]
- 2020 Research grant from the German Federal Ministry of Education and Research (BMBF) for the 2nd cycle of the D-MeerKAT-II consortium (with 8 German institutions).
- 2019 Computing grant of €305,000 from the BMBF on behalf of the D-MeerKAT.
- 2019 Grant application to the Volkswagen foundation’s “*Experiment*”. *Status – Unsuccessful*.
- 2018 Grant application for the ERC Starting Grant (2019 cycle). *Status – Unsuccessful*.
- 2017 Travel grant from the International Astronomical Union.
- 2005 Forbes Marshall Scholarship, Forbes Marshall Limited, Pune, India.

ACADEMIC DUTIES

- 2024 **Scientific organizing committee** of Cosmic magnetism in the pre-SKA era, Kagoshima, Japan
- 2022 **Local organizing committee** of the LOFAR Family Meeting 2022 [~ 150 participants].
- 2017–2021 **Management and co-ordination** of the D-MeerKAT consortium funded by the BMBF.
- 2017 **Organizer:** “Cosmic magnetism in galaxies” workshop on behalf of the Deutsche Forschungsgemeinschaft (DFG) Research Unit 1254 [30 participants].
- 2014– **Telescope proposal referee:** Giant Metrewave Radio Telescope (GMRT).
- 2013– **Manuscript referee:** Astronomy & Astrophysics (A&A), Astrophysical Journal (ApJ), Monthly Notices of the Royal Astronomical Society (MNRAS), Journal of Cosmology & Astroparticle Physics (JCAP), MDPI Galaxies, Journal of Astrophysics & Astronomy (JoAA).

Research Visits:

SISSA, Trieste, Italy February 2020
Host: Prof. Carlo Baccigalupi (Full Professor).

School of Mathematics & Statistics, Newcastle University, UK May 2016
Host: Dr. Andrew Fletcher (Senior Lecturer).

IPAC, California Institute of Technology, USA November–December 2012
Host: Prof. George Helou (Executive Director, IPAC).

Teaching responsibilities:

- 2019 **Master and Bachelor course** on “Introduction to Radio Astronomy” at Universität Bielefeld (summer semester).
- 2018 **Seminar course** for Master and Bachelor students on “Astrophysical magnetic fields: Origin & Measurement” at Universität Bielefeld (summer semester).
- 2013 **Teaching Assistant** to Dr. Divya Oberoi for tutorial on “Radio interferometric imaging with CASA” in Radio Astronomy School 2013 at NCRA–TIFR.

- 2012 **Teaching Assistant** to Dr. Subhashis Roy for the course on “Astronomical Techniques II” at the IUCAA–NCRA Graduate School.
- 2010,2011 **Teaching Assistant** for “Interferometric Techniques and Data Analysis” at Visiting Student’s Research Programme (VSRP) at NCRA–TIFR.

Academic supervision:

- 2023– **Post doc co-supervision** of Dr. Akriti Sinha with Prof. Matthais Hoefft, TLS Tautenburg, on “*MMGPS data analysis and OTF polarization calibration under the D-MeerKAT-III*”.
- 2022– **PhD thesis co-supervision** of Shivani Deshmukh with Prof. Dominik Schwarz, Universität Bielefeld on “*Searching for ALP dark matter using VLA and VLBA*”.
- 2020– **PhD thesis co-supervision** of Akriti Sinha with Dr. Abhirup Datta, DAASE, Indian Institute of Technology Indore on “*Radio continuum studies of uGMRT deep fields*”.
- 2020–2021 **Master thesis co-supervision** of Shivani Deshmukh with Prof. Dominik Schwarz, Fakultät für Physik, Universität Bielefeld on “*Searching gravitational lenses for detecting ALPs*”.
- 2019 (3 months) **Project supervision** of Dennis Maseizik, Fakultät für Physik, Universität Bielefeld on “*Impact of anomalous microwave emission on low frequency CMB foregrounds*”.
- 2019–2020 **Master thesis supervision** of Ferdinand Jünemann, Fakultät für Physik, Universität Bielefeld on “*Large sky-area scanning strategies for single dish surveys*”.
- 2010 **Co-research guide** with Dr. Subhashis Roy for VSRP student Sachin Wadhwa (University of Delhi) to study “*Radio–Far-infrared correlation*”.

TALK & POSTER PRESENTATIONS

Invited colloquia and talks:

- November 2024 **Talk** at the *COsmic Magnetism with RADio Astronomy COMRAD2024*, Pisa, Italy.
Title: “*Morphology of polarized emission from the action of fluctuation dynamo*”
- June 2024 **Talk** at the *Barolo Astroparticle Meeting BAM2024*, Barolo, Italy.
Title: “*Radio searches for Axions*”
- June 2024 **Talk** at the *Cosmic Interacting Matters – SFB1491 General Assembly*, Bochum, Germany.
Title: “*Observing turbulence scales and energetics from action of fluctuation dynamo*”
- May 2024 **Talk** at the *Invisible data days*, Garching, Germany.
Title: “*LOFAR2.0 Dark Matter eXperiment – LoDMaX*”
- February 2024 **Talk** at the *Center for Astrophysics*, Harvard, USA (over Zoom).
Title: “*Morphology and properties of polarized emission induced by fluctuation dynamo in the intracuster medium*”
- November 2023 **Talk** at the *GLOW Radio2023 meeting*, Bochum, Germany.
Title: “*Radio astronomy as a tool for dark matter searches*”
- August 2023 **Lecture** at the *Metal-THINGS nearby galaxies workshop*, ISSI, Bern, Switzerland.
Title: “*Thermal and nonthermal properties of the trubulent ISM*”
- November 2022 **Talk** at the *Verein für datenintensive Radioastronomie conference*, Würzburg, Germany.
Title: “*Tracing the kinematic and the magnetic ISM up to $z \sim 0.5$ using the MeerKAT*”
- October 2022 **Talk** at the *Cosmic Interacting Matters workshop*, Bochum, Germany.
Title: “*Radio–infrared relations in nearby and distant galaxies*”
- August 2022 **Lecture** at the *Metal-THINGS nearby galaxies workshop*, ISSI, Bern, Switzerland.
Title: “*Radio–infrared correlation in star-forming galaxies*”
- May 2021 **Talk** at the *NORDITA Astrophysics Seminars*, Stockholm University, Sweden.
Title: “*Searching for axion-like particles under strong gravitational lenses*” (over Zoom)
- September 2019 **Talk** at the *Towards Coordination of the European CMB Programme*, Paris, France.
Title: “*The S-Band Polarization Survey with an SKA Prototype*”
- March 2019 **Talk** at the *COSMOS workshop: Ground-based CMB experiments*, Milan, Italy.
Title: “*Low frequency efforts in Germany*”

- February 2018 **Colloquium** at *Ludwig-Maximilians-Universität*, Munich, Germany.
Title: “*Measuring magnetic fields in high-redshift galaxies*”
- December 2017 **Colloquium** at *NCRA–TIFR*, Pune, India.
Title: “*Magnetic fields in high-redshift galaxies*”
- June 2017 **Talk** at the *CHANG-ES meeting*, Bochum, Germany.
Title: “*New insights from high-resolution, low-frequency observations of the dwarf galaxy IC 10*”
- December 2016 **Colloquium** at *ASTRON*, Dwingeloo, The Netherlands.
Title: “*Cosmic magnetism in the era of broad-band spectro-polarimetry*”
- January 2016 **Colloquium** at *NCRA–TIFR*, Pune, India.
Title: “*Magnetic fields: Near and Far*”
- July 2015 **Talk** at *European Week of Astronomy and Space Science (EWASS) 2015*, Tenerife, Spain.
Title: “*Radio–Far-infrared correlation in ‘blue cloud’ galaxies up to $z \sim 1.2$* ”
- June 2015 **Talk** at the *CHANG-ES meeting*, Bonn, Germany.
Title: “*Methods of thermal emission separation: How important is it?*”

Invited seminars:

- January 2021 *Astronomisches Institut Ruhr-Universität Bochum*, Germany (over Zoom).
Title: “*Constraining CMB foregrounds using the SKA-MPG telescope*”
- June 2018 *Astronomisches Institut Ruhr-Universität Bochum*, Germany.
Title: “*All-sky polarization survey with the MPIfR-MT SKA dish*”
- May 2016 *Newcastle University*, Newcastle, United Kingdom.
Title: “*Can galaxy–galaxy mergers disrupt regular fields?*”
- January 2015 *Astronomisches Institut Ruhr-Universität Bochum*, Germany.
Title: “*Radio–Far infrared correlation in ‘blue cloud’ galaxies up to $z \sim 1.2$* ”
- December 2012 *Cahill Center for Astronomy and Astrophysics*, Caltech, Pasadena, USA.
Title: “*Nonthermal emission from normal galaxies: Radio–FIR correlation and energy equipartition*”

Contributed talks & poster:

- November 2024 Talk at the *GLOW Radio2024 meeting*, Erlangen, Germany.
- November 2021 Talk at the *GLOW Radio2021 meeting*, Garching, Germany.
- June 2021 Talk at the *European Astronomical Society meeting*, EAS 2021 virtual conference (over Zoom).
- March 2021 Plenary talk at the *A precursor view of the SKA sky*, SKA 2021 virtual conference (recorded).
- October 2020 Talk at the *GLOW Radio2020 meeting*, Garching, Germany (over Zoom).
- October 2019 Talk at the *GLOW meeting*, Dortmund, Germany.
- June 2019 Talk at *New Perspectives on Galactic Magnetism*, Newcastle University, Newcastle, UK.
- May 2019 Talk at the *Kosmologietag 2019*, Bielefeld University, Bielefeld, Germany.
- October 2018 Talk at the *GLOW meeting*, Jena, Germany.
- August 2018 Talk at the *30th International Astronomical Union*, Vienna, Austria.
- June 2018 Talk at *Probing the structure and evolution of nearby galaxies with radio observations*, Hamburg Sternwarte, Germany.
- December 2017 Talk at *Galaxies in Absorption*, IUCAA, Pune, India.
- October 2017 Talk at the *GLOW meeting*, Würzburg, Germany.
- May 2017 Talk at *Nearby Galaxies at Low Frequencies: Processes and Probes*, Gothenburg, Sweden.
- March 2017 Talk at *DFG FOR-1254 Cosmic Magnetism in Galaxies*, Bonn, Germany.
- November 2016 Poster at *Science for the SKA generation conference*, Goa, India.
- October 2016 Talk at *DFG FOR-1254 Cosmic Magnetism conference*, Berlin, Germany.

October 2014	Talk at the <i>Cosmic Magnetic Field conference</i> , Jagiellonian University, Kraków, Poland.
December 2013	Talk at <i>The Metrewavelength Sky conference</i> , NCRA–TIFR, Pune, India.
March 2011	Talk at <i>Diffuse Relativistic Plasma Workshop</i> , Raman Research Institute, Bangalore, India.

TECHNICAL SKILLS

Programming	Expert level knowledge: Python (astropy, numpy, scipy, lmfit, matplotlib, APLpy, beautifulsoup, urllib2); Advanced level knowledge: Fortran, Bash scripting, Python multiprocessing (joblib, multiprocessing, subprocess).
Software	Expert level knowledge in CASA, AIPS, WSClean, Topcat & Stilts, Aladin, Gnuplot, ds9 & XPA access points, Kvis, SuperMongo; Advanced level knowledge: CARACal; Basic experience with Le Phare, CIGALE, GravLens, LensFit.
HPC scale	Singularity, Slurm.
Algorithms	Polarization analysis: Stokes Q, U fitting, Rotation Measure Synthesis; Synthetic observations: Broadband radio polarimetry and polarization transfer; Multi-wavelength: Multi-dimensional catalogue matching and source characterization; Astrophysical correlations: FITS image gridding, <i>wcs</i> matching and flux analysis.
Web content	Basic level knowledge in HTML and Joomla.

LANGUAGE SKILLS

Native	English, Bengali, Hindi.
Very good command	Marathi, Oriya.
Basic	German A1.