

DR. OMKAR SURESH BAIT

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PROFESSIONAL RESEARCH EXPERIENCE

Post-Doctoral Fellow 02nd September, 2024 – Present

SKA Observatory, Jodrell Bank, Manchester, UK
Working in the SKA Science Team

Post-Doctoral Fellow 01st September, 2021 – 31st August, 2024

Observatory of Geneva, Switzerland
Working in the Starburst Galaxies Group with Prof. Daniel Schaerer

Senior Software Engineer 09th March, 2021 – 31st August, 2021

SMR Automotive Systems India Limited, Noida, India
Academic career break

Visiting Post-Doctoral Fellow 04th March, 2020 – 03rd March, 2021

NCRA-TIFR, Pune, India

Short Term Post-Doctoral Fellow 03rd Sept, 2019 – 28th Feb, 2020

NCRA-TIFR, Pune, India

EDUCATION

Ph.D. Physics July, 2014 – January 2020

- NCRA-TIFR, Pune, India
- PhD title: Star formation in and around nearby galaxies
- Supervisor: Prof. Yogesh Wadadekar.
- Thesis defended in January, 2020.

M. Sc. Physics July, 2013

- Indian Institute of Technology Kanpur (IITK), Kanpur, India.

B. Sc. Physics July, 2011

- University of Mumbai, Mumbai, India

RESEARCH INTERESTS

Radio Interferometric simulations

Novel AI-based radio data analysis algorithms

Radio Continuum and Neutral (HI) study of local analogues of high- z galaxies

Multi-wavelength spectral energy distribution (SED) modelling of galaxies.

TECHNICAL SKILLS

During my PhD and postdoc, I have gained extensive experience in analysing raw data from radio interferometers. In my postdoc particularly, I have gained experience in producing large-scale radio-simulated data. In general, I am equipped with the following technical skills:

Computer Languages	Python (extensive), R, Bash, Mathematica, MATLAB, L ^A T _E X, and HTML.
Astronomy Packages	CASA (extensive), AIPS, MAGPHYS, CIGALE, DS9, ALADIN, TOPCAT.
Computing	HPC computing (for CASA simulations), Slurm, GIT, AWS
Operating Systems	Linux (extensive), Mac (extensive), Windows

I am developing a modular CASA-v6 based radio imaging and spectral line data analysis pipeline, primarily for the GMRT and the VLA telescope. The current development version can be found on [github](#).

PUBLICATIONS (IN INTERNATIONAL REFEREED JOURNALS)

My [ADS Library](#) (or ORCID: [0000-0003-2722-8841](#)) contains a list of all the published/under-review papers. Following is the full list of papers including the ones submitted and in preparation.

Publications with significant contributions:

- *Radio Spectral Energy Distribution of Low- z Metal Poor Extreme Starburst Galaxies: Novel insights on the escape of ionizing photons*
Omkar Bait, Daniel Schaerer, Yuri Izotov, Biny Sebastian, 2025, to be submitted to A&A soon
- *Bridging the Gap: Examining Vision Foundation Models for Optical and Radio Astronomy Applications*
E. Lastufka,, **O. Bait**, M. Drozdova, V. Kinakh, D. Piras, M. Audard, M. Dessauges-Zavadsky, T. Holotyak, D. Schaerer, S. Voloshynovskiy, 2024, [Submitted to Astronomy & Astrophysics](#)
- *A Tale of NGC 3785: The Formation of an Ultra-Diffuse Galaxy at the end of the Longest Tidal Tail*
Chandan Watts, Sudhanshu Barway, **Omkar Bait**, Yogesh Wadadekar, 2024, **Accepted in Astronomy & Astrophysics Letters**
- *Self-Supervised Learning with MeerKAT Continuum Observations*
E. Lastufka,, **O. Bait**, O. Taran, M. Drozdova, V. Kinakh, M. Dessauges-Zavadsky, T. Holotyak, D. Schaerer, S. Voloshynovskiy, 2024, [Accepted in Astronomy & Astrophysics](#)
- *The Low-redshift Lyman Continuum Survey: Radio continuum properties of low- z Lyman continuum emitters*
Omkar Bait, Sanchayeeta Borthakur, Daniel Schaerer, Emmanuel Momjian, et. al., 2024, [A&A 688A 198B](#)
- *Radio-astronomical Image Reconstruction with Conditional Denoising Diffusion Model*
M. Drozdova, V. Kinakh, **O. Bait**, O. Taran, E. Lastufka, M. Dessauges-Zavadsky, T. Holotyak, D. Schaerer, S. Voloshynovskiy, 2024, [A&A, 683A, 105D](#)
- *HI Imaging of a Blueberry Galaxy Suggests a Merger Origin*
S. Dutta, A. Bera, **O. Bait**, C. Narayan, B. Sebastian, 2024, [MNRAS, 531, 5140D](#)
- *Rejuvenating Star Formation Activity in an Early-type Dwarf Galaxy, LEDA 1915372, with Accreted HI Gas*
Sanjaya Paudel, Suk-Jin Yoon, **Omkar Bait**, et al., 2023, [ApJL, 951, L36, 9](#)

- *Challenging interferometric imaging: Machine learning-based source localization from uv-plane observations*
O. Taran, **O. Bait**, M. Dessauges-Zavadsky, T. Holotyak, D. Schaerer, S. Voloshynovskiy, 2023, [Astronomy & Astrophysics](#), 674, id.A161
- *Predicting bulge to total luminosity ratio of galaxies using deep learning*
Harsh Grover, **Omkar Bait**, Preetish K. Mishra, Yogesh Wadadekar, 2021, [MNRAS](#), 506, 3313
- *Discovery of a large H α ring around the quiescent galaxy AGC 203001*
Omkar Bait, Sushma Kurapati, Pierre-Alain Duc, Jean-Charles Culliandre, Yogesh Wadadekar, Peter Kamphuis, Sudhanshu Barway, 2020, [MNRAS](#), 492, 1B
- *Predicting star formation properties of galaxies using deep learning*
Shraddha Surana, Yogesh Wadadekar, **Omkar Bait**, Hrushikesh Bhosle, 2020, [MNRAS](#), 493, 4808S
- *Radio continuum emission from local analogs of high- z faint LAEs: Blueberry galaxies*
Biny Sebastian & **Omkar Bait**, 2019, [ApJL](#), 882L, 19S
- *Outlying H α emitters in SDSS-IV MaNGA*
Omkar Bait, Yogesh Wadadekar, Sudhanshu Barway, 2019, [MNRAS](#), 485, 428B
- *On the interdependence of galaxy morphology, star formation, and environment in massive galaxies in the nearby Universe*
Omkar Bait, Sudhanshu Barway, Yogesh Wadadekar, 2017, [MNRAS](#), 471, 2687B

Contributing publications:

- Square Kilometre Array Science Data Challenge 3a: foreground removal for an EoR experiment
Bonaldi (**incl. O.Bait**) et al., 2025, submitted to MNRAS
- Bimodal Lyman Continuum Escape from Starbursts: Broad Emission-line Wings as a Diagnostic of Radiation- vs. Supernova-dominated Feedback
Komarova (**incl. O.Bait**) et al., 2025, close to submission to ApJ
- The Low-Redshift Lyman Continuum Survey: The Roles of Stellar Feedback and ISM Geometry in LyC Escape
Flury (**incl. O.Bait**) et al., 2024, [under review in ApJ](#)
- The Effect of Radiation and Supernovae Feedback on LyC Escape in Local Star-forming Galaxies
Carr (**incl. O.Bait**) et al., 2024, [under review in ApJ](#)
- Jet-mode feedback in NGC 5972: insights from resolved MUSE, GMRT and VLA observations
Ali (**incl. O.Bait**) et al., 2024, under review in ApJ
- Linking Mg II and [O II] spatial distribution to ionizing photon escape in confirmed LyC leakers and non-leakers
Leclercq (**incl. O.Bait**) et al., 2024, [A&A](#), 687L, 26A
- Ubiquitous broad line emission and the relation between ionized gas outflows and Lyman continuum escape in Green Pea galaxies

Amorin (incl. **O.Bait**) et al., 2024 [A&A](#), 682L, 25A

- *Probing galaxy evolution through HI 21-cm emission and absorption: current status and prospects with square kilometre array*
R. Dutta, S. Kurapati, Aditya J.H.N.S, **O. Bait**, 2022, [JApA](#), Volume 43, Issue 2, article id.103
- *Star-forming S0 Galaxies in SDSS-MaNGA: fading spirals or rejuvenated S0s?*
Rathore H., Kumar K., Mishra P. K., Wadadekar Y., **Bait O.**, 2022, [MNRAS](#), 513, 389

In Preparation:

- *Unusually Hot Dust in a Local Metal-poor Starburst galaxy*
Omkar Bait, Shobita Satyapal, Daniel Schaerer, et al., 2024, in preparation for [A&A Letters](#)
- *Resolved HI imaging study of a nearby blueberry galaxy*
Omkar Bait, Sushma Kurapati, Biny Sebastian, 2024, in preparation

OUR RESEARCH WORK IN THE PRESS

Our discovery of the large HI ring ([Bait et al. 2020](#)) got some media coverage in several popular science astronomy magazines. Following is a list of few of them:

- [Astronomy.com](#) – A ring of gas discovered circling a galaxy
- [Discover Magazine](#) – This Galaxy Has A Massive Ring of Gas Circling It
- [EurekAlert](#) – GMRT discovers a gigantic ring of hydrogen gas around a distant galaxy

It also appeared in several national and local Marathi newspapers in India. This includes the [Indian Express](#), [Hindustan Times](#), [ThePrint](#) and [Sakal Times](#).

OBSERVING EXPERIENCE

I have extensive observing experience with the Giant Metre Wave Radio Telescope (GMRT), VLA and MeerKAT. I have been allocated more than 300 hours of GMRT time and another ~200 hours to the VLA. Recently, we are also undergoing a MeerKAT observing program. I have also been allotted observing time on the Canada France Hawaii Telescope (CFHT), South African Large Telescope (SALT) and UV Imaging Telescope (UVIT) on ASTROSAT. Below I highlight a few of the proposals I am involved in.

Atleast as Co-I (GMRT, VLA, MeerKAT, JWST, XMM-Newton):

- GMRT observations of extreme star-forming galaxies (xSFGs) at Band-3 (0.3 GHz), 4 (0.6 GHz), and 5 (1.2 GHz) obtained in Cycle 43 and 45 (**PI: Omkar Bait**)
- Several VLA observations of xSFGs at L- (1.5 GHz), S- (3 GHz), and C- (6 GHz), X- (10 GHz) and Ku- (15 GHz) bands obtained in Cycle 23A and Cycle 24A (**PI: Omkar Bait**) and 25A (two accepted)
- MeerKAT (ID: MKT-23080) 100 hrs deep observations of the COSMOS field with the UHF band (PI: Miroslava Dessauges-Zavadsky **Technical Lead: Omkar Bait**).
- GMRT observations of xSFGs obtained in Cycle 38 at 0.3 and 1.2 GHz (PI: Biny Sebastian, **Co-I: Omkar Bait**)

- VLA follow up of LzLCS sources at L-, S-, and C-bands with data obtained in VLA Cycle 21B, and 23A (PI: Sanchayeeta Borthakur, **Co-I: Omkar Bait**)
- Several **PI-based** HI imaging program from GMRT Cycles 32, 33, 34, 36, 37 38.
- JWST MIRI Cycle 2 observations of xSFGs (PI: Daniel Schaerer **Co-I: Omkar Bait**)
- Two JWST Cycle 4 proposals (under-review) on LyC leakers, xSFGs (PI: Saldana-Lopez, Satyapal **Co-I: Omkar Bait**)
- XMM-Newton Approved proposal (ID: 94435) for xSFGs (PI: Daniel Schaerer **Co-I: Omkar Bait**)
- Chandra Cycle 26 Approved Proposal 26620185 for xSFGs (PI: Bret Lehmer **Co-I: Omkar Bait**)

As PI (with UVIT on ASTROSAT):

Star-forming S0 galaxies in the nearby universe

9 ks

PI: Omkar Bait. Co-I: Preetish K. Mishra, Yogesh Wadadekar, Sudhanshu Barway.
UV imaging of star forming S0 galaxies.

As Co-I (with CFHT):

Investigating the nature of a giant HI ring around AGC 203001

1.8 hrs

PI: Pierre-Alain Duc. Co-I: **Omkar Bait**, Yogesh Wadadekar, Jean-Charles Cuillandre.
Proposal accepted for a deep optical follow-up (~ 28 mag/arcsec²)
of the giant HI of ring in g , r and i bands.

As Co-I (with SALT)

SALT RSS spectroscopy of green pea galaxies in the Hyper Suprime-Cam survey

~ 5 hrs

PI: Surhud More. Co-I: **Omkar Bait**, Sandeep Rana, Kanak Saha.

With IRSF

Had a week-long observing experience with the InfraRed Survey Facility (IRSF) telescope.

PRESENTATIONS AT CONFERENCES

Swiss SKA Days, Zurich, Switzerland, September, 2024, **Contributed talk.**

SKACH Spring Meeting, Zurich, Switzerland, June, 2024, **Contributed talk.**

AI for Radioastronomy, Gothenburg, Sweden, May, 2024, **Contributed talk.**

Cosmology in the Alps, Les Diablerets, March, 2024, **Contributed talk.**

SKACH Winter meeting, January, 2024, **Contributed talk.**

Coordinated Surveys of the Southern Sky , ESO Garching, Munich, Feb - March, 2023, **Contributed talk.**

Swiss SKA Days, Lugano, Switzerland, October 2022, **Contributed talk.**

Promises of Artificial Intelligence: An Interdisciplinary Revolution, Geneva, Sept, 2022

Regular talks at the SKACH Spring and Winter Consortium meetings, from 2021-2023

Swiss SKA & Astrosignals Kickoff meeting, FHNW, Windisch, December, 2021, **Contributed talk**
Physics Application of AI Day, UniGE, Geneva, Nov. 2021, **Presented a poster.**

Swiss SKA Days, September 2021, **Attended Online.**

Space Science Workshop in IIT Kanpur, Feb. 2020, **Invited talk**

The Metrewavelength Sky - II, Pune, India, March, 2019, **Presented a poster.**

The HI/Story of the nearby Universe, Groningen, The Netherlands, September, 2018. **Presented a contributed talk.**

XXXth General Assembly of the International Astronomical Union Vienna, August, 2018.

- IAUS 344: Dwarf Galaxies: From the Deep Universe to the Present. **Presented a poster.**
- IAUS 347 Early Science with ELTs (EASE): **Presented a poster.**
- FM2: Warm and Hot Baryonic Matter in the Cosmos. **Presented a poster.**

Galaxy Evolution and Dynamical Structures (GEDS) - I, Pune, January, 2018. **Presented a contributed talk.**

XXXV Meeting of Astronomical Society of India (ASI), Jaipur, 2017. **Presented a contributed talk.**

XXXIV Meeting of Astronomical Society of India (ASI), Srinagar, 2016. **Presented a poster.**

SEMINAR TALKS:

National Centre for Radio Astrophysics, India, February, 2025, Colloquium talk

IfA, University of Edinburgh, United Kingdom, October, 2024 **Invited Colloquium talk**

Regular talks and attending the LzLCS group meetings, from 2021-2023

European Southern Observatory (ESO), Lunch Talk, Garching, September, 2018

Institut d'astrophysique de Paris (IAP), Journal-Club Galaxies talk, Paris, September, 2018

Astronomisches Institut, Ruhr-Universität Bochum (AIRUB), Bochum, September, 2018

Seminar at University of Western Cape (UWC), Cape Town, May, 2017

INTERNATIONAL COLLABORATIONS:

Member of the LOFAR and WEAVE-LOFAR Team, Officially joining soon

Member of the SKAO GHQ Science Team since Sept. 2024

Low Redshift Lyman Continuum Survey (LzLCS) group since June, 2022

SKA Switzerland Consortium (SKACH) since September, 2021

SKA Extragalactic Continuum Science working group

SKA Source Finding Group

PROFESSIONAL SERVICE

Reviewing abstracts for the "A new era in astrophysics: Preparing for early science with the SKAO" conference in Gornitz, Germany.

Referee for International Peer-Reviewed Journals: **Nature Communications, Astronomy & Astrophysics**, **Monthly Notices of the Royal Astronomical Society**, **RAS Techniques and Instruments (RASTI) journal**

VLA Science Review Panelist (High- z surveys) from Cycle 24B onwards

GMRT Observing Proposal Reviewer since 2021

Devasthal Optical Telescope proposal reviewer in early 2025

Regular Volunteer for the Geneva Observatory days

OTHER SCIENTIFIC ACTIVITIES

ML for Radio Astronomical Images, Geneva, May, 2024, **Mini-lecture in AI for Physics course.**

Leading one of the SKA - Indian Consortium group for the SKA Data Challenge - 2.

Outreach talk titled “The life and Death of galaxies in the Universe” at Bahona College, Assam, India, July 2022

TEACHING/STUDENT SUPERVISION EXPERIENCE

Co-supervised two undergraduate project students, Dec. 2019 - 2022
Himansh Rathore (IIT Bombay) and N R Kavın (IISER Bhopal)
Project Title: Resolved MaNGA IFU study of star forming early-type galaxies

Co-supervised two undergraduate project students, Jun. - Jul. 2018
Kaustav Das (IIT Kanpur) and Siddharth Jha (IISc, Bangalore)
Project Title: The efficacy of SED fitting codes in deriving galaxy physical parameters

Teaching Assistant for Introduction to Astronomy
course for the IUCAA-NCRA graduate school Aug. - Sept. 2019

Teaching Assistant for Galaxies: structure, dynamics and evolution
course for the IUCAA-NCRA graduate school Jan. - Mar. 2018

Teaching Assistant for Galaxies: structure, dynamics and evolution
course for the IUCAA-NCRA graduate school Jan. - Mar. 2017

ORGANISATIONAL SKILLS

Regular volunteer for the Annual Science day organized by NCRA-TIFR & GMRT.

Part of the scientific organising committee for Young Astronomer’s Meet (YAM), September, 2017.

GRANTS

XXXth General Assembly (GA) of the International Astronomical Union (IAU) grant, August 2018.

Student visit under the Indo-South African bilateral grant for six weeks, April, 2017.

NAMES OF REFEREES:

1. Prof. Daniel Schaerer
Institution: Observatoire de Genève, Université de Genève, Switzerland
Designation: Professor
Email: daniel.schaerer@unige.ch
Relation: PostDoc Supervisor
 2. Prof. Sanchayeeta Borthakur
Institution: Arizona State University, USA
Designation: Associate Professor
Email: sborthak@asu.edu
Relation: Primary Scientific Collaborator
 3. Prof. Slava Voloshynovskiy
Institution: Université de Genève, Switzerland
Designation: Professor
Email: svyatoslav.voloshynovskyy@unige.ch
Relation: PostDoc Co-Supervisor
 4. Dr. Miroslava Dessauges-Zavadsky
Institution: Observatoire de Genève, Université de Genève, Switzerland
Designation: Senior lecturer and researcher
Email: miroslava.dessauges@unige.ch
Relation: Primary Scientific Collaborator
 5. Prof. Yogesh Wadadekar
Institution: National Centre for Radio Astrophysics -Tata Institute of Fundamental Research (NCRA-TIFR), Pune, India
Designation: Associate Professor
Email: yogesh@ncra.tifr.res.in
Relation: PhD Supervisor
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