Rohan Dahale

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EDUCATION

Department of Physical Sciences — **Class Rank: 2 out of 60**
5 year BS-MS Dual Degree Programme — **CGPA : 9.40 out of 10**
Indian Institute of Science Education and Research Kolkata — Aug 2017 - present

Relevant Coursework: Fluid and Magneto-hydrodynamics, Independent Study: Computational Magneto-hydrodynamics, General Theory of Relativity, Stellar Astrophysics, Data Analysis in Astronomy

RESEARCH INTERESTS

Active Galactic Nuclei (AGN), Jets in AGN, VLBI imaging, Blazars, Quasars, NLS1 galaxies

In particular, I am interested in studying how jets in AGN are formed, what their **magnetic field structure** is and how it affects the **jet formation**. I am curious to find out how these jets stay **collimated at large scales**. I want to focus on these questions by analysing and studying radio **observations**. I also intend to learn and perform **simulations** of the jets to compare them with the observations.

PUBLICATIONS

Unravelling the origin of extended radio emission in narrow-line Seyfert 1 galaxies with JVLA
Accepted for publication in Astronomy & Astrophysics. DOI: 10.1051/0004-6361/202141698
E. Järvelä, **R. Dahale**, L. Crepaldi, M. Berton, E Congiu, R. Antonucci.

RESEARCH EXPERIENCE

Magnetic fields in relativistic jets of supermassive black holes
Master Thesis supervised by Dr. José L. Gómez
Funded by JAE Intro 2021 Scholarship — Jun 2021 - present
Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain

- Analysing **multi-frequency VLBA polarimetric** observations from the BG216 program to determine magnetic field strcuture in the jet of the AGN and hence understand the jet formation and stability
- The initial phase and amplitude calibration are performed on the **AIPS** using **ParselTongue** following the standard procedure for polarimetric observations. The data is cleaned, self-calibrated, and imaged both in total and polarized intensity with **Difmap** and `eht-imaging`.

Extended radio emission in narrow-line Seyfert 1 galaxies with JVLA
Supervised by Dr. Emilia Järvelä — May 2019 - Jun 2021
University of California, Santa Barbara

- Accepted for **publication in Astronomy & Astrophysics**, 16 September 2021. arXiv:2109.07841
- Determined the predominant sources of radio emission in a sample of **44 NLS1** galaxies, selected based on their extended kpc-scale radio morphologies at **5.2 GHz**
- Calibrated the data using the EVLA pipeline and produced the radio maps and spectral index maps using the **CASA** `tclean` task to do multi-term (multi-scale) multi-frequency synthesis, `mt-mfs`
- Additionally produced tapered maps to enhance the sensitivity to extended structures. Post-imaging, several correction steps were performed to achieve the final spectral index maps.

QSO PG 1630+377 Lyman edge polarisation May 2019 - Jun 2021
University of California, Santa Barbara, ***Manuscript in Preparation***

- **Collaboration: Prof. Robert Antonucci, Dr. Dean Hines, Prof. Makoto Kishimoto, Anshuman Acharya**
- The polarisation of the quasar measured with the HST/FOS showed a steep rise below the Lyman edge, reaching above $\sim$ **20**%, never seen before in non-blazar active galaxies (**Koratkar A. et al., 1995**).
- Used the HST/FOC observations to determine the polarisation on both sides of the Lyman edge using the `photutils` of **AstroPy** and followed up with the same set of FOS observations to find that the results of Koratkar A. et al., 1995 are incorrect.

Polarisation of Cygnus A at different wavelengths Jun 2021 - present
University of California, Santa Barbara, ***Manuscript in Preparation***

- **Collaboration: Prof. Robert Antonucci, Dr. Dean Hines, Prof. Makoto Kishimoto, Anshuman Acharya**
- Measured the polarisation at Optical-UV range using the **HST/FOC** data and `photutils` of **AstroPy**.
- Since the polarimetric results for the Cygnus A at IR using the NICMOS are already published, percent polarisation at different wavelength ranges is now available.

Characterisation of wineglasses with respect to Young's modulus as a function of temperature using laser interferometry Jun - Dec 2019
VISION 2019, Physical Research Laboratory, Ahemdabad, India

Detection of H1 21cm line and its astrophysical significance Dec 2018
Radio Astronomy Winter School (RAWSC), NCRA-IUCAA Pune, India

Determination of surface tension by diffraction of light on capillary waves May - Jul 2018
Summer Research Project. Supervisor: Prof. Rangeet Bhattacharyya, IISER Kolkata

ACADEMIC ACHIEVEMENTS

JAE Intro 2021 Scholarship Oct 2021 - present
Consejo Superior De Investigaciones Científicas (CSIC), Spain

- Offered to students interested in starting a research career that may lead to the realization of PhD thesis
- Scholarship used for the Master Thesis supervised by **Dr. José L. Gómez** at the **Instituto de Astrofísica de Andalucía (IAA-CSIC)**. The scholarship amounts to **3000 EUR** for five months.

INSPIRE Scholarship Aug 2017 - present
Department of Science and Technology (DST), India

- Offered to **top 1**% students in 12th grade exams, undertaking Bachelor and Masters level education in the Natural Sciences. The scholarship amounts to **80,000 INR** ($\sim$ **900 EUR) every year**.

VIkram Sarabhai Innovation competitiON (VISION) 2019 Jun - Dec 2019
Physical Research Laboratory, Ahemdabad, India

- Received a grant of **300,000 INR** ($\sim$ **3400 EUR**) and got selected among the **Top 6** teams **in India.**

Radio Astronomy Winter School (RAWSC) 2018 Dec 2018
National Centre for Radio Astrophysics(NCRA), Pune, India
Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune, India

- Among the **Top 30** students selected **in India.**

Vijyoshi National Science Camp 2017 Dec 2017
Department of Science and Technology (DST), India -INSPIRE

TEACHING ASSISTANTSHIPS

Spring 2021: PH1201: Electricty and Magnetism Apr - Jul 2021
Level: First Year BS-MS, IISER Kolkata

Autumn 2020: PH1101: Mechanics I Dec 2020 - Mar 2021
Level: First Year BS-MS, IISER Kolkata

Autumn 2020: PH3103: Mathematical Methods for Physics Aug - Dec 2020
Level: Third Year BS-MS, IISER Kolkata

SKILLS

Astronomy	AIPS, ParselTongue, Difmap, `eht-imaging`, CASA, AstroPy
Programming	Python: Matplotlib, NumPy, SciPy, Pandas; Jupyter Notebook, C++
Softwares	MATLAB, LaTeX, Inkscape, ImageJ
Languages	Proficient in English, Hindi, Marathi, Beginner in Spanish

ATTENDED CONFERENCES

Looking at the polarized Universe: past, present, and future 24 - 28 May 2021
The RoboPol Collaboration

ngEHT November 2021 Meeting 1 - 5 Nov 2021
From Vision to Instrument: Designing the Next-Generation EHT to Transform Black Hole Science

- Participating in SWGs: Black Holes & their cosmic context and Jet Launching and Accretion

EXTRACURRICULARS

Class Representative, Department of Physical Sciences Aug 2019 - Dec 2020
Indian Institute of Science Education and Research Kolkata

Convener of Science Club of IISER Kolkata Aug 2018 - May 2019

REFERENCES

Dr. José L. Gómez
Research Scientist, Instituto de Astrofísica de Andalucía (IAA - CSIC), Granada, Spain
jlgomez@iaa.es

Dr. Emilia Järvelä
Research Fellow at European Space Agency, European Space Astronomy Centre, Spain
ejarvela@sciops.esa.int

Prof. Robert Antonucci
Professor at Department of Physics, University of California, Santa Barbara
antonucci@physics.ucsb.edu