

Rohan Dahale

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EDUCATION

Indian Institute of Science Education and Research Kolkata

1st Aug 2017 - Present

5 year BS-MS Dual Degree Programme

CGPA : 9.40 out of 10

Final Year, Department of Physical Sciences

(Graduation: May 2022)

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, Quasars, BL Lac Objects, narrow-line Seyfert I galaxies, Polarimetry.

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 multi-frequency **observations**. I also intend to learn and perform GRMHD **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: July 2021, Astronomy and Astrophysics, E. Järvelä, **R. Dahale**, L. Crepaldi, M. Berton, E. Congiu, R. Antonucci. (insert arXiv link)

The puzzle of the quasar QSO PG 1630+377 Lyman edge polarisation.

Submitted: xxxx 2021, The Astrophysical Journal, **R. Dahale**, A. Acharya, D. Hines, M. Kishimoto, R. Antonucci. (insert arXiv link)

RESEARCH EXPERIENCE

Magnetic fields in relativistic jets of supermassive black holes.

Master Thesis supervised by Dr. José L. Gómez

June 2021 - Present, Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain

- Analysing the **multi-frequency VLBA polarimetric** observations from the BG216 program to determine magnetic field structure 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 will be cleaned, self-calibrated, and imaged both in total and polarized intensity with **Difmap**.

Polarisation of Cygnus A at different wavelengths.

Collaboration: Prof. Robert Antonucci, Dr. Dean Hines, Prof. Makoto Kishimoto, Anshuman Acharya

June 2021 - Present, Manuscript in Preparation

- Calculated the % polarisation at Optical-UV range using the **HST/FOC** data and photutils of **AstroPy**.
- Since the polarimetry results for the Cygnus A at IR using the NICMOS are already published, percent polarisation at different wavelength ranges is now available.

Unravelling the origin of extended radio emission in narrow-line Seyfert 1 galaxies with JVLA.
Supervised by Dr. Emilia Järvelä.

May 2019 - June 2021, Visiting Scholar at University of California, Santa Barbara

- 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 producing 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 α (spectral index) and $\Delta\alpha$ maps.

The puzzle of the quasar QSO PG 1630+377 Lyman edge polarisation.

Collaboration: Prof. Robert Antonucci, Dr. Dean Hines, Prof. Makoto Kishimoto, Anshuman Acharya

May 2019 - June 2021, Visiting Scholar at University of California, Santa Barbara.

- The %Polarisation of the QSO measured with the HST/FOS showed a steep rise below the Lyman edge, reaching values above $\sim 20\%$, never seen before in non-blazar active galaxies (**Koratkar A. et al., 1995**).
- Used the HST/FOS 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, 1995 are incorrect.

OTHER PROJECTS

Characterisation of wineglasses with respect to Young's modulus as a function of temperature using laser interferometry

June-December 2019, VISION 2019, Physical Research Laboratory, Ahmedabad, India

Detection of H1 21cm line and its astrophysical significance.

December 2018, Radio Astronomy Winter School (RAWSC) 2018, NCRA-IUCAA Pune, India

Determination of surface tension coefficient by diffraction of light on capillary waves.

May-July 2018, Summer Research Project. Supervisor: Prof. Rangeet Bhattacharyya, IISER Kolkata.

ACADEMIC ACHIEVEMENTS

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 (~ 1100 USD) every year** upto 5 years.

Vikram Sarabhai Innovation competiTiON (VISION) 2019

Jun -Dec 2019

Physical Research Laboratory, Ahmedabad, India

- Received a grant of **INR 300,000 (\sim USD 4300)** and got selected among the **Top 6 teams in India**.

Visiting Scholar at University of California, Santa Barbara

May- July 2019

Radio Astronomy Winter School (RAWSC) 2018

December 2018

National Centre for Radio Astrophysics(NCRA), Pune, India

Inter University Center for Astronomy and Astrophysics (IUCAA), Pune, India

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

Vijyoshi National Science Camp 2017

December 2017

Department of Science and Technology (DST), India -INSPIRE

SKILLS

Astronomy	AIPS, ParselTongue, Difmap, CASA, AstroPy
Programming	Python: Matplotlib, NumPy, SciPy; C++
Softwares	MATLAB, L ^A T _E X, Inkscape, ImageJ.
Languages	Proficient in English, Hindi, Marathi, Beginner in Spanish.

TEACHING ASSISTANTSHIPS

Spring 2021: PH1201 (First Year) - Electricity and Magnetism	April - July 2021
<i>Instructor: Prof. Partha Mitra, Department of Physical Sciences</i>	
Autumn 2020: PH1101 (First Year) - Mechanics I	Dec 2020 - Mar 2021
<i>Instructor: Prof. Golam M. Hossain, Department of Physical Sciences</i>	
Autumn 2020: PH3103 (Third Year) - Mathematical Methods for Physics	Aug- Dec 2020
<i>Instructor: Prof. Rajesh Kumble Nayak, Department of Physical Sciences</i>	

EXTRACURRICULARS

Class Representative, Department of Physical Sciences	Aug 2019 - Dec 2020
<i>Indian Institute of Science Education and Research Kolkata</i>	
Convener of Science Club of IISER Kolkata	Aug 2018 - May 2019

REFERENCES

Dr. José L. Gómez

Research Scientist, Instituto de Astrofísica de Andalucía-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