Aniket Nath

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Education

2020 - 2025 **National Institute of Science Education and Research Bhubaneswar** ,
Integrated Masters in Physical Sciences(major),Computer Sciences(minor), Affiliated to HBNI, CGPA - 8.65/10.

Research Experience

LTVSP **Investigating polarisation signatures in Black holes**,
Supervisor: Dr. Pallavi Bhat, ICTS-TIFR.

- This project is under Long Term Visiting Students program of ICTS.
- Studying the geometry of black hole shadows in different physical context.
- The work is in progress.

Master's Thesis **Constraining Galactic Magnetic Field properties from Radio observations**,
Supervisor: Dr. Tuhin Ghosh, NISER Bhubaneswar.

- This is in continuation with the Summer 2023 work.
- Simulated Synchrotron maps using best fitted parameters with respect to WMAP data.
- Studying the statistics of these fields using Power spectrum, Minkowski Functionals.
- Looking into the specific scales of interest.
- The work is in progress.

Summer 2024 **Construction of Dark Matter Halo Merger Trees**,
Supervisor: Dr. Sambit Giri, Nordic Institute of Theoretical Physics, NORDITA.

- The aim of this project was to study dark matter halo merger trees for different cosmologies.
- *GALFORM* algorithm, based on Extended Press Schecter Theory was used to construct merger trees.
- Merger trees were constructed for different cosmological parameters, and their variation was observed.

Independent Research Project **SALSA: Self Supervised Active Learning Search Algorithm**,
Supervisor: Dr. Subhankar Mishra, NISER Bhubaneswar.

- The project aimed at developing an algorithm to explore latent space of representation learning algorithms, and find samples from minority classes.
- It essentially aimed to increase the labelling efficiency for minority classes, i.e., the algorithm learned to sample a specific class in a more efficient way.

Summer 2023 **Correlating properties of Galactic Magnetic Field and Galactic Synchrotron**,
Supervisor: Dr. Pravabati Chingangbam & Dr. Tuhin Ghosh , IIA Bengaluru, NISER Bhubaneswar.

- The aim of this project was to study Galactic Magnetic Field (GMF), using two-point correlation function and higher statistics.
- Synchrotron maps have been simulated using models and different input parameters using the *gpempy* module.
- Statistics were evaluated for these maps, and the properties were being studied using the statistics.
- Tried to match the statistics with data, by exploring the parameter space.

Summer 2022 **Analysing X-ray spectra of Dual AGNs**,
Supervisor: Dr. Mousumi Das & Dr. Santanu Mondal, IIA Bengaluru.

- The project aimed at analysing x-ray spectral signatures from dual AGNs.
- Observed Fe K α spectral signature in a binary system, previously unreported.
- This work has been accepted in Astronomy & Astrophysics, the manuscript can be found here

Publications

2024 **Detection of the Fe K lines from the binary AGN in 4C+37.11**,
Santanu Mondal, Mousumi Das, K. Rubinur, Karishma Bansal, ***Aniket Nath****, Greg B. Taylor*, [arxiv][A&A].

Achievements

2024 **NORDITA Summer Intern, Nordic Institute of Theortical Physics(NORDITA)** , *Intern*.

2023 **SERB MATRICS Fellow (Science and Engineering Research Board, Govt. of India)**, *Fellowship*.

2022 **Summer Research Fellow (IASc, INSA, NASI)**, *Fellowship*.

2020 **DISHA (DAE Incentive Scheme for Holistic Science Education and Augmentation) Scholarship, Govt. of India**, *Scholarship*.

Schools, Workshops, Conferences

Summer 2024 **COBRA: Conference on Blazars and Restless AGNs**, *Presidency University, IUCAA*.
- Hosted by Presidency University, in collaboration with IUCAA.
- Attended as a participant in Workshop and the Conference.

Monsoon 2024 **Physics of Life Monsoon School**, *NCBS-TIFR*.
- Hosted by National Centre for Biological Sciences, Tata Institute for Fundamental Research, at Bengaluru.
- Attended as a participant, and had the opportunity to explore some domains of biophysics.

Winter 2023 **Advanced 21 cm Cosmology Winter School**, *NISER Bhubaneswar*.
- Hosted by NISER Bhubaneswar as a part of the SKA-India Collaboration.

Winter 2022 **Radio Astronomy Winter School**, *IUCAA, NCRA*.
- Jointly hosted by Inter-University Centre for Astronomy and Astrophysics (IUCAA) and National Centre for Radio Astronomy - Tata Institute of Fundamental Research (NCRA-TIFR),

Teaching Experience

Teaching Assistant — CS460/660 Machine Learning 2024

Computer Skills

Languages — Python, Julia, FORTRAN

. Utilities — Anaconda, Git, Jupyter Notebook, LaTeX

. Libraries — Healpy, NaMaster(pymaster), Numpy, Astropy ,Pandas, Scipy, Matplotlib

. Softwares — NASA-HEASOFT, XSPEC, Chandra CIAO

Communication Skills

English — Full Professional Proficiency

Hindi — Native or Bilingual Proficiency

Bengali — Native or Bilingual Proficiency

Relevant Courses

P474 Introduction to Cosmology, Grade:8/10

P452 Computational Physics, Grade:9/10

P457 General Theory of Relativity and Cosmology, Grade:10/10

P464 Plasma Physics and Magnetohydrodynamics, Grade:8/10

P453 Quantum Field Theory-I, Grade:9/10

P463 Astronomy and Astrophysics, Grade:9/10

Extra Curricular

2021 - Current **Vaktavya (Debating Club), NISER**, *Founding Member*.
I am a member of the Vaktavya (Debating Club) in NISER. I often participate in various debating competitions, in different formats. I have also participated in a Lok Sabha (Mock Parliament). I am also serving as the President of Vaktavya for the tenure (2024-2025).

2020 - Current **NISER Astronomy Club, NISER**, *Core-Member*, Talks Organizing Committe.
I am a core member of NISER Astronomy Club. I am mainly involved in outreach and organizing of talks, in order to popularize and make astronomy and astrophysics more accessible to people of all levels.

2017 **The Bharat Scouts and Guides, India**, *Rajya Puraskar Scout*.
I have been a member of the Bharat Scouts and Guides, and I was awarded the Rajya Puraskar in scouting by the Hon'ble Governor of the State of West Bengal.