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https://sohinidutta.com
https://github.com/sohinixcvii

SOHINI DUTTA

EDUCATION

Jodrell Bank Centre for Astrophysics, University of Manchester, Manchester, UK — *PhD in Astronomy*

October 2023-Present

PhD supervisor: Dr. Phil Bull

Indian Institute of Technology, Indore, Madhya Pradesh, India — *Master of Science in Astronomy*

August 2020 - August 2022

Course Description: Fundamentals of Quantum Mechanics, Electrodynamics, Mathematical Methods, Relativity and Cosmology, Astrophysical Fluids and Plasma, Radio Astronomy, Extragalactic Astronomy, Astrostatistics, Stellar astrophysics and stellar remnants (white dwarves, neutron stars and black holes)

Aggregate Cumulative Grade Point Average: 9.82 (out of 10.0)

University of Delhi, New Delhi, Delhi, India — *Bachelor of Science(Honors) in Physics*

2016-2019

Course Description: Classical mechanics, Classical Dynamics, Electrodynamics, Quantum Mechanics, Waves and Optics, Mathematical Physics, Analogue and Digital Electronics, Nanomaterials and Applications, Solid State Physics

Cumulative Grade Point Average: 7.243 (out of 10.0)

RESEARCH EXPERIENCE

Jodrell Bank Centre for Astrophysics, University of Manchester, Manchester, UK

OCTOBER 2023 - Present

Using Gaussian-constrained realizations and Gibbs sampling to deal with HERA systematics in the larger Hydra Bayesian visibility modeling tool.

Indian Institute of Technology, Indore, India

AUGUST 2021 - PRESENT

Estimating the Epoch of Reionization parameters from CII power spectrum and CIIx21cm cross-power spectrum using an ANN-based emulator and Bayesian Inference.

Project Supervisor: Dr Suman Majumdar

National Center for Radio Astronomy, Pune, India

MAY 2021 - AUGUST 2021

Searching for nulling in millisecond pulsars using radiofrequency observations from the Giant Metrewave Radio Telescope (GMRT).

Project Supervisor: Dr Bhaswati Bhattacharyya

National Physical Laboratory, New Delhi, India — *Summer Internship*

May 2017 - July 2017

Worked on the analysis of hydroelectric cells and the rate of ion production and pH change as a function of time.

Project Supervisor: Dr Ved Varun Agarwal

Other Projects and Collaborations:

- RHINO: A large horn antenna for detecting the 21cm global signal
- Analysis of tomographic 21-cm images expected from the Square Kilometer Array (SKA):
    - Interpreting the HI 21-cm cosmology maps through Largest Cluster Statistics -- I: Impact of the synthetic SKA1-Low observations
    - Enhancing Threshold Determination in Future SKA 21-cm Images: A Machine Learning Approach to LCS Analysis
- Artificial neural network to predict neutral fraction values from simulated 21cm maps (in collaboration)
- Code to calculate angular power-spectrum from 2-dimensional observational maps (in collaboration)
- MCMC code to estimate cosmological parameters from supernova Ia data
- Study of redshift dependence of AGN abundance
- ARIMA modeling to predict time series data

WORK EXPERIENCE

The University of Manchester, Manchester, UK – ***Graduate Teaching Assistant***, *Teaching Assistant and Lab demonstrator for course Object-Oriented Programming in C++*

January 2024-May 2024

Co-Supervisor-B.Sc. dissertation, *Supervised undergraduate students for their dissertation projects with Dr. Phil Bull*

September 2024-November 2024

American Express, Gurugram, India – ***Analyst-Data Science***, *Credit and Fraud risk and Global Decision Science team*

October 2022-June 2023

SKILLS and EXPERIENCE

Skills	Experience
• Programming (Python, C/C++, SQL, PySpark) • Artificial Neural Networking (ANN) • Linux • LaTeX • Microsoft Office • Web Development (HTML5, CSS)	• Simulations (N-body, Fof halo-finder, semi-numerical CII, and HI simulations) • Bayesian Inference (MCMC) • Data engineering and modeling informed classifiers in industry settings (using GBMs) • EquiTea at JBCA website development

PUBLICATIONS

- Philip Bull, Ahmed El-Makadema, Hugh Garsden, John Edgley, Neil Roddis, Jens Chluba, Christopher J. Conselice, Sohini Dutta, Katrine A. Glasscock, Ainulnabilah Nasirudin, Jordan Norris, Michael J. Wilensky, Isabelle Ye, Zheng Zhang, "RHINO: A large horn antenna for detecting the 21cm global signal"
- Sohini Dutta, Suman Majumdar, Himanshu Tiwari, Chandra Shekhar Murmu, "*Interpreting multi-wavelength observations of the Epoch of Reionization from next-generation telescopes*", URSI-RCRS, 2022
- Saswata Dasgupta, Samit Kumar Pal, Satadru Bag, Sohini Dutta, Suman Majumdar, Abhirup Datta, Aadarsh Pathak, Mohd Kamran, Rajesh Mondal, Prakash Sarkar, "*Interpreting the HI 21-cm cosmology maps through Largest Cluster Statistics -- I: Impact of the synthetic SKA1-Low observations*"
- Saswata Dasgupta, Satadru Bag, Suman Majumdar, Sohini Dutta, "*Analysis of realistic HI 21-cm maps from Epoch of Reionization using Largest Cluster Statistics (LCS)*", URSI-RCRS, 2022

CONFERENCES AND WORKSHOPS

- Talk on "*Interpretation of multiwavelength observations of the epoch of reionization from next-generation telescopes*" at **SKA EoR-Cosmic Dawn Science Team Meeting: Data Challenges in the SKA Era**, (Sept 27, 2022), Sala Stemmi, Scuola Normale Superiore, Piazza dei Cavalieri 7, Pisa, Italy
- "*Predicting neutral fraction from simulated 21-cm maps using Convolutional Neural Networks (CNN)*" for **Astro Hack Week 2022**, (Oct 17-21, 2022), Max Planck Institute of Astronomy, Heidelberg, Germany as co-leader of team *CosmoHackers*
- Talk on "*Interpretation of multiwavelength observations of the epoch of reionization from next-generation telescopes*" at **Workshop on 21-cm Cosmology in the SKA Era**, (Oct 31 2022-Nov 04 2022), Indian Statistical Institute, Baranagar, West Bengal, India
- Talk on "*Interpretation of multiwavelength observations of the epoch of reionization from next-generation telescopes*" at **2022 URSI Regional Conference on Radio Science**, (Dec 1 2022-Dec 4 2022), Indian Institute of Technology, Indore, Madhya Pradesh, India
- Talk on "*Interpretation of multiwavelength observations of the epoch of reionization from next-generation telescopes*" at **32nd meeting of Indian Association for General Relativity and Gravitation (IAGRG32),** (Dec 19 2022-Dec 21 2022), IISER Kolkata, West Bengal, India
- "Constraining Reionization Parameters from 21-cm Observational Data" at **Big Data Cosmology School**, May 1, 2023-May 8,2023, International Centre for Theoretical Sciences (ICTS), Bangalore, Karnataka, India
- Talk on "Interpretation of multiwavelength observations of the epoch of reionization from next-generation telescopes" at **Kavli Science Focus Meeting - Science with the 21-cm line** (February 5, 2024-February 7, 2024), Kavli Institute of Cosmology, University of Cambridge, Cambridge, UK
- Talk on "Bayesian power spectrum estimation with built-in systematics modeling for the HERA array" at **AT-RASC URSI** (May 18, 2024-May 24, 2024), Gran Canaria, Spain
- Course: **AST9240 - Bayesian cosmological data analysis** (September 2, 2024-September 13, 2024), University of Oslo, Oslo, Norway

HOBBIES AND INTERESTS:

- You can find my blog here, where I write about Astronomy and my experiences in academia sometimes
- I am also a self-taught artist and enjoy painting. Some of my favourite pieces can be found here.

OTHER ACHIEVEMENTS:

- **Joint Admission Test for M.Sc.(JAM)**-*Indian Institute of Technology*
    - YEAR: 2020
    - National Rank: 344 (out of approximately 13,000 candidates)
- **Offered PhD positions at the University of Cambridge, The University of Manchester, University of Heidelberg, and Swinburne University**
- **Student outreach representative for Jodrell Bank Centre for Astrophysics** (Nov 2023-Present)
- **Cosmology Lunch journal club organizer at Jodrell Bank Centre for Astrophysics** (April 2024-Present)
- **Web Mistress for EquiTea at JBCA** (Nov 2023-present)