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# Bipradeep Saha

*Curriculum Vitae*

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*sparxastronomy.github.io/*

## Profile

A fourth-year student of BS-MS Dual Degree Program with Physics as Major at Indian Institute of Science Education and Research – Kolkata, with interests in data intensive astronomy and astrophysics, and financial markets. My objective is to create interest among the youngsters in the field of Sciences, and to develop creative learning experience for lifelong knowledge.

## Education

Aug. 2019 - Present **5 Year BS-MS Dual Degree**

**Indian Institute Of Science Education and Research Kolkata**

**Major :** Physical Sciences, **Minor :** Mathematics and Statistics

**CGPA :** 9.24/10 ≡ 3.70/4.0 (As of 6th semester)

2017 - 2019 **All India Senior Secondary Certificate Examinations**

**Vinay Nagar Bengali Sr. Secondary School**, New Delhi

**Affiliation :** Central Board of Secondary Education (CBSE)

**Score :** 95%

## Research Experiences

May. 15, 2022 - Sept. 30, 2022 **Effect of AGN feedback on Large Scale Matter Distribution**

**Dr. Sownak Bose** (ICC, University Of Durham)

During this project, I used high resolution NBody simulations, to study how varying the AGN feedback effects the Large Scale Matter distribution. I've used 2 and 3 point correlation functions to quantify the changes and explain how different parameters controlling the AGN feedback effects the matter distribution.

May. 20, 2021 - July. 30, 2021 **Project on Gravitational Waves and GW Data Analysis**

**Dr. Rajesh Kumble Nayak** (IISER Kolkata)

During this project, where I learnt about Gravitational Waves(GW) and GW data analysis. I learnt about parameter estimation and the problems we faced while estimating Parameters. This project extensively used the python package PyCBC. I also learnt about Particle Swarm Optimization approach to parameter estimation

Dec. 28, 2020 - Jan. 09, 2021 **Radio Astronomy Winter School - 2020**

Jointly Organised by **IUCAA - Pune** and **NCRA**

This was a short radio astronomy school where we learnt about the basics of radio astronomy and in the end presented a short presentation of data from GMRT. (The report and the presentation can be found here)

June 15, 2020 – Aug. 30, 2020 **Electron Acoustic Wave in two electrons populated, dense Fermi plasma with electron exchange and correlation effect**

**Dr. Swarniv Chandra**

I attended the plasma physics workshop by Dr. Swarniv Chandra and worked on Quantum Plasmas. I obtained the Dispersion Relation for Electron Acoustic Wave in two electrons populated, dense Fermi plasma, and further worked to get the KdV equation for the same. I studied the dependence of solitary structures on various plasma parameters.

# Publications

- **Biradeep Saha**, & Sownak Bose (2022). *Effect of AGN Feedback on large scale matter distribution* (in preparation)
- Chandra, S., & **Bipradeep Saha**. (2020). Electron acoustic waves in two temperature fermi plasma with electron exchange and correlation effects. ***SSRN***. https://doi.org/10.2139/ssrn.4047489

# Projects Undertaken

## Completed

**(1)** Electron Acoustic Wave in two electrons populated, dense Fermi plasma with electron exchange and correlation effect

**(2)** Multi-wavelength composition of Cas-A SNR

**(3)** Spectral study of SNR DEM-L71 and review of old results(Project Page)

## Ongoing

**(1)** Development of N-Body Simulation(Project Page)

**(2)** Search for galaxy clusters using Mesh search (Project Page)

**(3)** Expansion Study of Cas-A SNR

**(4)** Development of scripts for interactive command line based astronomical data analysis(Project Page)

# Research Interests

- **General Astrophysics, Cosmology and General Relativity**
  Interested in the evolution of universe, how large scale structures were formed. How Dark matter and Dark energy plays its role in the present day evolution of universe
- **Computational Physics and Machine Learning**
  Interested in statistical inference from large data sets, how concepts of ML can be used to solve big data problems in astronomy and help solve earth based problems. Also interested in using ML for data analysis of large surveys like DES, LSST(upcoming), etc.
- **Theoretical Physics**
  Interested in Quantum Mechanics, Quantum Information and Technology

# Technical Skills

- **Python** : Numpy, Pandas, Astropy, Sci-Py, Scikit-learn, Matplotlib
- **Matlab** : Intermediate

- **Julia, C++** : Basics
- **Version Control**: Git
- **Basic Web-development** : HTML, CSS, Javascript
- LaTeX
- **Software** : Adobe Photoshop, Origin

## Conferences & Workshop

Aug. 2021 Chandra Data Science Workshop-2021

Aug. 2020 SLAC Summer School in Astronomy

Sep. 2019 RAD@Home workshop at IISER-Kolkata

## Awards

2020 International Astronomy and Astrophysics Competition (2020) – Bronze Honor

## Scholastic and Curricular Achievements

2020 - 2021 Secretary of Science Club of IISER-Kolkata

2019 District topper (CBSE Higher Secondary Exams - 2019) (South West Delhi-New Delhi)

2014 - 2017 Taken Part in various national level Science and Mathematics Olympiads

## Relevant Courses Taken

- Classical Mechanics, Introduction to Special Relativity
- Introduction to Thermal Physics, Statistical Mechanics
- Intermediate Electricity and Magnetism, Advance Quantum Mechanics
- Mathematical Methods -I, II ; Computational Physics
- Quantum Field Theory - I*, Advance Math Methods For Physicist*, Condense Matter Physics*
- Real Analysis, Linear Algebra
- Probability - I ; Statistics - I ; Numerical Analysis, Statistics - II*
- For more details refer to teaching plan of IISER-Kolkata.

  * ≡ course is currently under progress.

## Interests

Drawing, Photography(Astrophotography, Nature), Driving, Science Communication Activities

## References


- **Dr. Rajesh Kumble Nayak**
  Professor
  Department of Physical Sciences
  Indian Institute of Science education and Research - Kolkata, India
- **Dr. Sownak Bose**
  Assistant Professor (Research)
  Institute of Computational Cosmology
  University of Durham, United Kingdom