

Bipradeep Saha

MS STUDENT · COMPUTATIONAL COSMOLOGY

☎ (+91) 7303544269 | ✉ bipradeepsaha04@gmail.com | 🏠 sparxastronomy.netlify.app/ | 📱 sparxastronomy | 📄 bipradeep-saha

“Be the change that you want to see in the world.”

Education

5 Year BS-MS Dual Degree (Nearing Completion)

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH KOLKATA

Kolkata, India

Aug. 2019 - Present

- **Major:** Physics **Minor:** Mathematics and Statistics
- **CGPA:** 9.24/10

All India Senior Secondary Certificate Examinations

VINAY NAGAR BENGALI SENIOR SECONDARY SCHOOL,

New Delhi, India

Apr. 2017 - Apr. 2019

- **Affiliation:** Central Board of Secondary Examination **Score:** 95%

Publications

- **Biradeep Saha**, & Sownak Bose. Quantifying the impact of AGN feedback on the large-scale matter distribution using two- and three-point statistics (in preparation)
- Swarniv Chandra, & **Bipradeep Saha (2022)**. Electron acoustic waves in two temperature fermi plasma with electron exchange and correlation effects. **SSRN**. doi.org/10.2139/ssrn.4047489.

Research Experience

Dr. Rahul Kannan (York University)

Toronto, Canada

MASTER'S THESIS

May. 2023 - Present

- Over the past decade, numerous works have refined the general picture of in-homogeneous metal enrichment and the transition to Pop II star formation. Understanding the details of Pop III formation is crucial for piecing together present-day galaxy formation.
- Building upon the previous works I'm creating new Thermo-chemistry, Metal enrichment and supernova feedback routine for PopIII stars
- Using these routines and High-resolution Radiation Hydrodynamic simulation, we are studying the effect of PopIII stars on the evolution of galaxies

Dr. Rajesh Kummble Nayak (IISER - Kolkata)

Kolkata, India

RESEARCH PROJECT ON GRAVITATIONAL WAVES

Aug. 2023 - Present

- We are testing General Relativity using Gravitational Waves
- We are developing methods for simultaneous detection of PN parameter from GW. The methods are based on Likelihood function flavour of Particle Swarm Optimization.

Dr. Joachim Harnois-Deraps (Newcastle University)

Newcastle, UK

INTERNSHIP ON GRAVITATIONAL LENSING

Apr. 2023 - Oct. 2023

- I performed a map level infusion of Intrinsic Alignment in Modified Gravity Simulation, which was never done before.
- I tested this new method against existing methods and results are in excellent agreement.
- Opened up new avenues of research: One team is working on Deep Learning Based estimation of Cosmological Parameters with better constraint.
- One team is working on complete marginalization over IA for better prediction from Weak Lensing survey.

Dr. Sownak Bose (ICC, Durham University)

Durham, UK

INTERNSHIP ON COSMOLOGICAL SIMULATIONS

Apr. 2022 - Dec. 2022

- Used the EAGLE simulations to study how AGN Feedback manifest on the large scale matter distribution.
- Identified and explained why certain parameters introduce large changes in matter distribution.
- Identified important statistics that are sensitive to changes due to AGN Feedback.
- This work will be extended to future cosmological simulations- MilleniumTNG, Flamingo

Dr. Rajesh Kummble Nayak (IISER - Kolkata)

Kolkata, India

INTERNSHIP ON GRAVITATIONAL WAVES

May - Sep. 2021

- Reading Project on Gravitational Waves and its detection techniques
- Learned and implemented match filtering using PyCBC.
- Also learned about Particle Swarm Optimization approach for GW detection

IUCAA and NCRA

Pune, India

RADIO ASTRONOMY WINTER SCHOOL

Dec. 2020 - Jan. 2021

- Learned about Radio astronomy and its various applications, data folding and related challenges.
- At the end, presented our analysis of Pulsar data from GMRT (report can be found [here](#))

Dr. Swarniv Chandra (Jadavpur University)

Kolkata, India

INTERNSHIP ON PLASMA PHYSICS

May - Aug. 2020

- Attended workshop on Plasma Physics by Dr. Swarniv Chandra and worked on Quantum Plasmas.
- Obtained the dispersion relation for Electron Acoustic Wave in two electrons populated, dense Fermi plasma.
- Further obtained the KdV equation for the same and studied the dependence of solitary structures on various plasma parameters.

Teaching

EXPLORE - IV Program

JUNIOR MENTOR - HIGH REDSHIFT GALAXIES

Oct. 2023 - Current

- Mentoring a group of five international students
- Evaluating and grading the research work of participants
- Providing timely inputs to the research done by the participants
- Topics: Scientific Computing with Python, Computational Galaxy Formation, Data Analysis from N-Body Simulations

Skills

- **Python** (Advance) : Numpy, Pandas, Astropy, Sci-Py, Scikit-learn, Matplotlib, PyCCL
- **Matlab, Julia, C, C++** : Intermediate
- **Open-MPI, Open-MP** : Intermediate
- **Cuda**: Intermediate
- **Version Control** : Git
- **Relevant Prerequisites** : Probability and Statistics, Fluid and Magneto-hydrodynamics, General Relativity, Quantum Mechanics and Field Theory, Statistical Mechanics, Computational Physics

Workshops

Jul. 2023 Computational MHD with PLUTO

IISc Bangalore

Aug. 2021 Chandra Data Science Workshop

Virtual

Aug. 2020 SLAC Summer School in Astronomy

Virtual

Sep. 2019 RAD@Home Workshop

IISER-Kolkata

Honors & Awards

2020 **Bronze Honor** - International Astronomy and Astrophysics Competition (2020)

Scholastic and Curricular Achievements

2020-21 Secretary of Science Club

IISER-Kolkata

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

References

Dr. Rahul Kannan

ASSISTANT PROFESSOR

DEPT. PHYSICS AND ASTRONOMY, YORK UNIVERSITY

Email: kannanr@yorku.ca

Dr. Sownak Bose

ASSISTANT PROFESSOR

INSTITUTE FOR COMPUTATIONAL COSMOLOGY, DURHAM UNIVERSITY

Email: sownak.bose@durham.ac.uk

Prof. Rajesh Kumble Nayak

PROFESSOR

DEPT. OF PHYSICAL SCIENCES, IISER - KOLKATA

Email: rajesh@iiserkol.ac.in

Dr. Joachim Harnois-Deraps

LECTURER

SCHOOL OF MATHEMATICS, STATISTICS AND PHYSICS - NEWCASTLE UNIVERSITY

Email: joachim.harnois-deraps@ncl.ac.uk