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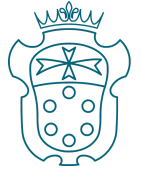
RESEARCH INTERESTS

My current research is focused on **Galaxy Formation and Evolution**, especially its applications to **Cosmology**.

ACADEMIC BACKGROUND

Scuola Normale Superiore, Pisa, Italy *(Nov 2023 - 2027)*	**PhD in Computational Astrophysics and Cosmology**
Indian Institute of Science Education and Research Kolkata, India *(Aug 2018 - Jun 2023)*	**BS-MS Dual Degree (Physics Major)**

PUBLICATIONS AND CONFERENCE/SEMINAR TALKS

Non-Gaussian Imprints in the Cosmic Microwave Background	Weekly online meeting on cosmology (WOMC), Indian Institute of Technology Madras
Gravitational Waves Background (NANOGrav) from Quintessential Inflation **Das, B.**; Jaman, N.; Sami, M	arXiv:2307.12913 [gr-qc] **Phys. Rev. D**
Non-Gaussian Imprints in the Cosmic Microwave Background	Cosmology from Home 2023 conference
Indirect imprints of primordial non-Gaussianity on cosmic microwave background **Das, B.**; Ragavendra, H.V.	arXiv:2304.05941 [astro-ph.CO] submitted to **Phys. Rev. D** and under review

AWARDS AND FELLOWSHIPS

Awarded the "National Initiative on Undergraduate Science" **(NIUS) scholarship**, that funded my participation in research projects (mentioned in section below).	2019 & 2021
Awarded the "Undergraduate Associateship" **(UGA) scholarship** program at Saha Institute of Nuclear Physics, India, that fully funded my participation in the research project (mentioned in section below).	2019
Selected for the International Asteroid Search Campaign.	2020

RESEARCH PROJECTS

Project	Guide	Outcome	Duration
Cosmology with Galaxy Clusters Comparing cosmological models by analysing expected and observed distribution of galaxy clusters over a range of redshifts.	Dr. Stefano Ettori (INAF-OAS, Bologna, Italy)		Aug 2023 - Ongoing
Study of primordial perturbations, non-Gaussianity and their observational effects Investigated/ing models of inflation, perturbations in fields generated due to them and non-Gaussianity associated with them. (MS thesis & project at RRI)	Dr. Koushik Dutta [1] & Dr. H.V. Ragavendra [2] & Prof. Shiv. K. Sethi [2] ([1] IISER Kolkata & [2] Raman Research Institute, India)	1. Codes in Cosmology: https://github.com/mimibarnali00/Cosmology 2. See section "Peer Reviewed Publications"	Jul 2022 - Jun 2023 & Aug 2023 - Ongoing
Primordial Gravity waves Studied the properties of primordial gravity waves.	Prof. Rajesh Kumble Nayak (IISER Kolkata, India)	Independent Study Report	Aug 2022 - Nov 2022
Study of properties of Millisecond Pulsars Determined the binary period and its relation to the mass of the pulsar's companion star and the eccentricity of its orbit for a sample of 200+ millisecond pulsars available in ATNF pulsar catalogue. (Funded by NIUS)	Dr. Bhaswati Bhattacharyya (National Centre for Radio Astrophysics, India)	Report on "Study of the Pulsars Discovered with the GMRT High Resolution Southern Sky Survey-II"	Jun - Jul 2021

Identifying Pulsar signals from the GMRT telescope's raw data Analyzed pulsar signals from GMRT radio data using the "PRESTO" software. (Funded by NIUS)	Dr. Bhaswati Bhattacharyya (National Centre for Radio Astrophysics, India)	Report on "Study of the Pulsars Discovered with the GMRT High Resolution Southern Sky Survey"	Dec 2019
Quantum Bomb detection Investigated the regime of interaction free measurement in quantum physics, applied to the scenario of bomb detection.	Prof. Prasanta K. Panigrahi (IISER Kolkata, India)	Preprint: Demonstration of Bomb Detection Using the IBM Quantum Computer	Dec 2018 - Feb 2019
Literature-review project in Astro-particle Physics Explored the basics of particle physics, classical and quantum field theory. (Funded by UGA)	Prof. Ambar Ghosal (Saha Institute of Nuclear Physics, India)		Jul 2019

OTHER PROJECTS

Work experience	Program	Duration
Analysing galaxy images at different wavelengths using the NASA sky view platform.	"RAD@home citizen-science research" by Prof. Ananda Hota (University of Mumbai - Department of Atomic Energy, Centre for Excellence in Basic Sciences)	Ongoing
Examining multiband galaxy images from the Subaru HSC survey.	"Citizen Science with Pune Knowledge Cluster"	Ongoing
Asteroid Search Camp wherein I observed near-Earth objects and Main Belt asteroids by analysing ".FITS" images from Pan-STARRS using "Astrometrica" software.	International Astronomical Search Collaboration	Jun 2020
Employed MATLAB to analyse the rotation curve of the Milky way and to research concepts of Dark Matter and modified Newtonian dynamics.	Observational Astronomy Workshop by Prof. Nirupam Roy (Indian Institute of Science) in National Students' Space Challenge organised by Indian Institute of Technology Kharagpur	Sep 2018

SKILLS AND EXPERIENCE

IT Skills	**Languages**: Python, Matlab, Fortran (Basic), HTML, Mathematica; **OS/Applications**: Windows, Linux, LATEX, MS-office; **Softwares**: PRESTO, Origin Pro, Astrometrica, CAMB, COSMOMC, Colossus; **Machine Learning**: quadratic classifiers, PCA (Principal component analysis), LDA (Linear discriminant analysis), kPCA (Kernel Principal component analysis), KNN (K-nearest neighbors), K-means clustering, Cross validation and Bootstrap resampling methods
Teaching Experience	Teaching Assistant at IISER Kolkata for: 1. "General Theory of Relativity and Cosmology" (a 4th year BS-MS course with 60 students) 2. "Waves and Optics" (a 2nd year BS-MS course with 200+ students) 3. "Mathematical Methods of Physics" (a 3rd year BS-MS course with 80 students).
Leadership Experience	Contributed in the logistics team of the 32nd meeting of Indian Association for General Relativity and Gravitation (IAGRG) which hosted 325 participants. Organized the "Utkal Divas 2021" event at IISER Kolkata for a 300+ audience. Served in the organizing team of the "Ek Pehal Anniversary 2020" event at IISER Kolkata for 350+ spectators.
Communication	Fluent in English, Hindi, Odia and have a good knowledge of Bengali.

CONFERENCES/WORKSHOPS

2023	Cosmology from Home 2023 (international virtual conference).
2023	In-person workshop on the Less Travelled Path to the Dark Universe, hosted by International Center for Theoretical Sciences, India.
2023	Summer Programme hosted by Indian Institute of Astrophysics (IIA).

2022	The [10th KIAS Workshop on Cosmology and Structure Formation](#), hosted by Korea Institute for Advanced Study, Seoul, Korea.
2022	32nd meeting of Indian Association for General Relativity and Gravitation, hosted by IISER Kolkata, India.
2022	An Inaugural Conference on [Current Status of Cosmology](#), organised by The Thanu Padmanabhan Center for Cosmology and Science Popularization (CCSP), SGT University, Delhi, India.
2022	The 21st National Space Science Symposium (NSSS), hosted by Center of Excellence in Space Sciences India (CESSI) and IISER Kolkata, India.
2019	The National Initiative on Undergraduate Science (NIUS Physics) 16.1 camp initiated by Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research (TIFR), India.
2018	The National Students' Space Challenge initiated by Indian Institute of Technology (IIT), Kharagpur, India.

SCIENTIFIC OUTREACH

- Authored articles in IISER Kolkata's multilingual science communication monthly magazine "Cogito137: The Thought Capsule".
- Own a science blogging website "https://vigyanaparichaya.wixsite.com/vigyanaparichaya" in Odia and English and its youtube channel "https://www.youtube.com/channel/UC7drnNHdxAhkUJcYPF3Q4pA".
- Volunteered in "Ek Pehal" which is an initiative by IISER Kolkata to provide free education (in Science, English and Maths) to underprivileged young students. I also participated in the monthly outreach activities which included demonstrating science experiments to high school kids to motivate them towards pursuing science.
- Contributed to the social media scientific outreach team of the National Space Science Symposium (NSSS) 2022.

INTERNATIONAL ASSOCIATIONS

Active member of the "Supernova Foundation", an International mentoring organisation, wherein I interact with more senior scientists and participate in webinars on career development.