CURRICULUM VITAE

Barnali Das

BS-MS Dual Degree Undergraduate
IISER KOLKATA
West Bengal, INDIA, 741246

IISER KOLKATA
(+91) 9437942080
mimi.barnali.00@gmail.com

RESEARCH INTERESTS

My current research is focused on "**Galaxy Formation and Evolution**", especially its applications to "**Cosmology**". (During my BS-MS Dual Degree, I proactively applied for and was awarded with two scholarships to carry out three research projects, including projects in the field of pulsar using radio data from GMRT.)

ACADEMIC BACKGROUND

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER) Kolkata, India	**BS-MS DUAL DEGREE (Physics Major)** Year: Fifth *Duration: August 2018-May 2023*	CGPA obtained: 8.08 out of 10 (I have obtained A or A+ grades in 26 of my courses, including A+ in Advanced Mathematical Methods of Physics and Computational Physics and A in Fluid and Magneto-hydrodynamics and Quantum Mechanics)
D.A.V. PUBLIC SCHOOL, Chandrasekharpur, Bhubaneswar Odisha	**Higher Secondary Examination 2018** Conducted By: Central board of Secondary Education (CBSE), Govt. of India	Marks obtained: 91.8% (93.75% excluding physical education)
D.A.V. PUBLIC SCHOOL, MCL Bandhabahal, Jharsuguda, Odisha	**10th Class Examinations** Conducted by: Central board of Secondary Education (CBSE), Govt. of India	CGPA obtained: 10 out of 10 Placed amongst the top 1% students in the country.

AWARDS AND FELLOWSHIPS

2019 & 2021	Awarded the "National Initiative on Undergraduate Science" (NIUS) scholarship, that funded my participation in research projects (mentioned in section below).
2019	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).
2016	One of the ~1000 students in my country to qualify the written exam of "KVPY" (Kishore Vaigyanik Protsahan Yojana) scholarship.
2020	Selected in "National Anveshika Experimental Skills Test" (NAEST) prelims.
May 2015	Selected among top 20 students of Odisha state in India, in YATS (Young Astronomer Talent Search) program in 2014, organised by "TATA STEEL" in collaboration with "Pathani Samanta Planetarium", Bhubaneswar, Odisha, India. As a prize I was allowed a visit of 2 days to the Space Application Centre of Indian Space Research Organization (**ISRO**) in Ahmedabad.
2018	Qualified JEE (Joint Entrance Examination) – Mains.
2020	Selected for the International Asteroid Search Campaign.

RESEARCH PROJECTS

Duration	**Project**	**Professor**	**Outcome**
December 2018 to February 2019	Quantum Bomb detection I investigated the regime of interaction free measurement in quantum physics, applied to the scenario of bomb detection.	Prof. Prasanta K. Panigrahi (Indian Institute of Science Education and Research Kolkata, India)	"Demonstration of Bomb Detection Using the IBM Quantum Computer" Author name: Raj, A.; **Das, B.**; Behera, B. K.; Panigrahi, P. K., Foundations of Physics Journal, submitted and under review.
June &July 2021	Study of properties of Millisecond Pulsars	Prof. Bhaswati Bhattacharyya	Report on "Study of the Pulsars Discovered with the GMRT

	I 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)	(National Centre for Radio Astrophysics, India)	High Resolution Southern Sky Survey-II"
December 2019	Identifying Pulsar signals from the GMRT telescope's raw data I used the "PRESTO" software to detect pulsar signals from GMRT radio data. (Funded by NIUS)	Prof. Bhaswati Bhattacharyya (National Centre for Radio Astrophysics, India)	Report on "Study of the Pulsars Discovered with the GMRT High Resolution Southern Sky Survey"
July 2019	Literature-review project in Astro-particle Physics I covered the basics of particle physics, classical and quantum field theory. (Funded by UGA)	Prof. Ambar Ghosal (Saha Institute of Nuclear Physics, India)	
May 2019	Determining properties of microplastics I studied the effect of microplastics on the environment, especially their attractive/repulsive behaviour in the presence of nanoparticles of silver and copper compounds in various types of water.	Prof. Gopala Krishna Darbha (Indian Institute of Science Education and Research Kolkata, India)	Minor contribution to the research paper "Metal oxide nanoparticles and polycyclic aromatic hydrocarbons alter nanoplastic's stability and toxicity to zebrafish"
July 2020	Quantum finance I studied the application of Monte Carlo simulations to finance using the IBM quantum computer.	Prof. Prasanta K. Panigrahi (Indian Institute of Science Education and Research Kolkata, India)	

OTHER PROJECTS

Duration	Work experience	Program
Ongoing	I am 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)
June 2020	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
2020	Test on my ability to devise physical experiments using home items only. Experiments I successfully carried out: 1. Find image and object distance of thick cylindrical water lens 2. Refraction phenomena of some liquids 3. Load extension of rubber bands	NAEST (National Anveshika Experimental Skills Test)
September 2018	I used 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

SKILLS AND EXPERIENCE

IT SKILLS	**Languages**: Python, Matlab, Fortran, HTML; **OS/Applications**: Windows, Linux, LATEX, MS-office;

	Packages/Tools/Softwares: PRESTO, NumPy, Matplotlib, Python Image Library (Pillow), Math, SciPy, Sympy, Astropy, Origin Pro, Gnuplot, Adobe Photoshop, Blender, Adobe Character Animator, Chem draw, Astrometrica, COSMOMC; **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	I have been a Teaching Assistant for Waves and Optics course (2nd year BS-MS Course; 200+ students) at IISER Kolkata. I was hired by "Chegg" to be a Tutor/Expert to teach physics to international students.
LEADERSHIP EXPERIENCE	I organized the "Utkal Divas 2021" event at IISER Kolkata for a 300+ audience. I was in the organizing team of the "Ekpehal Anniversary 2020" event at IISER Kolkata for 350+ spectators.
COMMUNICATION	I am fluent in English, Hindi, Odia and have a good knowledge of Bengali and Assamese and can understand Marathi.

SEMINARS PRESENTED

2021 "Period of binary and Mass of the companion relation of Binary Pulsars" in front of research group members in the National Centre for Radio Astrophysics, India.

2021 "Aitoff plot for various characteristics of Binary Millisecond Pulsars" in front of research group members in the National Centre for Radio Astrophysics, India.

2021 "Pulsar timing" in front of research group members in the National Centre for Radio Astrophysics, India.

2021 "Millisecond Pulsars" in front of research group members in the National Centre for Radio Astrophysics, India.

2021 "Astronomy Paper Seminal Participation Guide and Reading Walkthrough" in front of research group members in the National Centre for Radio Astrophysics.

2019 "Present condition in the aspect of Plastic Pollution" in front of lab members (~10 people) in IISER Kolkata.

2015 "Effective Management of Sewage for a Better Tomorrow" on behalf of my school to an audience of students and teachers from 20 schools.

2014 "Excessive Use of Plastics Is a Threat to the Environment" on behalf of my school to an audience of students and teachers from 19 schools.

SCIENTIFIC OUTREACH

- I am one of the authors of IISER Kolkata's multilingual science communication monthly magazine "Cogito137: The Thought Capsule".
- I have my own science blogging website "https://vigyanaparichaya.wixsite.com/vigyanaparichaya" in vernacular language (Odia and English).
- I also have a science education youtube channel "https://www.youtube.com/channel/UC7drnNHdxAhkUJcYPF3Q4pA".
- I am a volunteer 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 participate in the monthly outreach activities which includes demonstrating science experiments to high school kids to motivate them towards pursuing science.
- I have been a part of the social media scientific outreach team of the National Space Science Symposium (NSSS) 2022 conference.

INTERNATIONAL ASSOCIATIONS

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

CONFERENCES ATTENDED

2022 The 21st National Space Science Symposium (NSSS) in 2022, hosted by Center of Excellence in Space Sciences India (CESSI) and Indian Institute of Science Education and Research (IISER) Kolkata.

June 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 (NSSC) initiated by Indian Institute of Technology (IIT), Kharagpur, India.

SEMINARS ATTENDED

2021 “Introduction To Topology and Differential Geometry for Physicists ” by Prof. Sunil Mukhi of IISER Pune, India.
2021 “Border Collision Bifurcation” by Prof. Soumitro Banerjee of IISER Kolkata, India.
2020 “Pulsars, Magnetars & Fast Radio Bursts” by Prof. Jocelyn Bell Burnell.
2020 “Quantum Aspects of Black Hole Physics” by Prof. Eugenio Bianchi of The Pennsylvania State University, USA.
2019 “Disentangling the Cosmic Web with Fast Radio Bursts” by Prof. J. Xavier Prochaska of University of California, Santa Cruz, USA in the National Centre for Radio Astrophysics, India.
2019 “Radio Astronomy Techniques/Basics” by Prof. Avinash Deshpande of the Raman Research Institute, India in the Inter-University Centre for Astronomy and Astrophysics, India.
2018 “Freshwater flux in the bay of Bengal during Holocene” by Prof. Prosenjit Ghosh of IISC , Bangalore, India in IISER Kolkata, India.
2018 “Application of scanning probe methods in biology at the nanoscale” by Prof. Tatini Rakshit of IIT Guwahati, India in IISER Kolkata, India.
2018 “Beyond the standard model” by Prof. Surjeet Rajendran (2017 breakthrough prize laureate) in IIT Kharagpur, India.
2017 “Introduction to Quantum Chemistry” by Prof. Sudhansu Sekhar Tripathy (president of the URANIUM trust) in D.A.V. PUBLIC SCHOOL, Chandrasekharpur, Bhubaneswar, Odisha, India.
2017 “Introduction to Quantum physics” by Prof. Sanjay Swain of NISER in D.A.V. PUBLIC SCHOOL, Chandrasekharpur, Bhubaneswar, Odisha, India.

PEER REVIEWED PUBLICATIONS

“Demonstration of Bomb Detection Using the IBM Quantum Computer”
Author name: Raj, A.; **Das, B.**; Behera, B. K.; Panigrahi, P. K., Foundations of Physics Journal, submitted and under review.