

Atreyi Dasgupta

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Education

Apeejay School Nerul	<i>Mumbai</i>
High School Diploma	2007 - 2021
BITS Pilani, Hyderabad Campus	<i>Hyderabad</i>
Integrated Masters Degree, Physics	2021 - 2025
CGPA : 7.83	

Technical Skills

Programming	Matlab, C, Python, Mathematica
Libraries and Software	Pandas, Numpy, Scipy, Astropy, Jupyter Notebooks, matplotlib, emcee, corner, IPTA, Autocad
Development	Office, Git, L ^A T _E X, HTML
Languages	English, Hindi, Bengali

Projects

Identification of C-type Solar flares in the XSM Catalog	<i>UC San Diego</i>
Guided by Aravind Bharathi	December 2023 - Ongoing
<ul style="list-style-type: none">Engaging in a comprehensive project focused on the analysis of X-ray light curves obtained from cutting-edge solar observation instruments aboard the Chandrayaan 2 orbiter (XSM) and the upcoming Aditya L1 satellite (SoLEXS).Conducting an extensive review of relevant research papers to gain insights into HTF and Impulsive flares.Visually analysing lightcurves and working an algorithm to detect Type C flares.	
Exploring Radiative processes using Radio Astronomy Data Analysis	<i>IIT Bombay, Kritika Club</i>
Guided by Arvind Balasubramanian and Kunal Deshmukh	Summer 2023
<ul style="list-style-type: none">Mastered foundational radio astronomy concepts using CASA software for data analysis and interpretation.Developed proficiency in processing radio telescope data, generating informative plots for clear visualization.Utilized MCMC techniques to extract the afterglow of GW170817 and investigated fast radio bursts (FRBs) and dispersion measure (DM) values for insights into energetic bursts and intervening medium.	
Simulation of Binary Black Holes	<i>BITS Pilani</i>
Guided by Dr. Rickmoy Samanta	January 2024 - Ongoing
<ul style="list-style-type: none">Implementing Binary Black Hole Simulations in Einstein Gravity as well as modified theories of Gravity.Checking the validity of the theories of gravity by comparing the simulations to present-time data.Comparing the Binary Black Hole simulations with LIGO-VIRGO data.	
Study of Neural Network-based Model for Predicting Equations of State of Neutron Stars	<i>BITS Pilani</i>
Guided by Dr. Sarmishtha Banik	Summer 2023
<ul style="list-style-type: none">Understanding the behaviour of Neural Networks and how it can be implemented to predict observables of neutron stars.Study of different machine learning models based on neural networks to analyze to predict the equations of state of neutron stars.Developed a base understanding of the physics of TOV equations.	
Pulsar Data Analysis using InPTA	<i>BITS Pilani</i>
Course Project: Radio Astronomy	September 2023
<ul style="list-style-type: none">Utilized the 'psredit' subroutine from the PSRCHIVE package to extract relevant data from the early epoch data files.Employed the 'psrplot' subroutine within the PSRCHIVE package to generate plots such as: frequency against phase and obtaining the intensity versus phase plot, which represented the average or integrated profile for the pulsar.Used 'psredit' to retrieve the Dispersion Measure (DM) and ascertain the DM correction status.	
Data Analysis using Horn Antenna	<i>BITS Pilani</i>
AD ASTRA club	December 2023 - Ongoing
<ul style="list-style-type: none">Developing a precise physical model of radio astronomy, incorporating horn antenna design and optimization techniques.Utilizing low noise amplifiers and soundcard-based data transfer methods to collect high-quality astronomical data.Determining the relative speed of the hydrogen gas clouds in the Milky Way Galaxy to plot the Galaxy Rotation Curve.	
Fundamentals of General Relativity	<i>BITS Pilani</i>
Guided by Dr. Rahul Nigam	Dec. 2022 - May 2023
<ul style="list-style-type: none">Proficient understanding of special relativity, including Lorentz transformations, time dilation, length contraction, and the concept of spacetime.Skilled in visualizing events using Minkowski, spacetime diagrams, and comprehensive knowledge of the spacetime interval.Developed problem-solving skills in applying general relativity principles to explain phenomena such as gravitational waves and black holes.	

Geometrical Extension of Einstein's General Relativity

BITS Pilani

Guided by Dr. Bivudutta Mishra

August 2023 - December 2023

- Conducting an in-depth study of **Teleparallel formulation of Gravity**.
- Utilizing advanced mathematical tools and theoretical frameworks to formulate and analyze the proposed extension, ensuring consistency with observational data and established principles of modern cosmology.
- Utilizing the low-redshift data to impose observational constraints on the free parameters of the $f(R, G) = R^n G^{1-n}$ model through the implementation of the Markov Chain Monte Carlo (MCMC) method.

Awards and Honors

2023 **International Astronomy and Astrophysics Competition: Silver Honour**

- Under the top 15 percentile internationally

2024 **Lifetime Achievement Award**

- Issued by a student-run body in BITS, Voted as most achieved in the batch of 2021 in the female category

Position Of Responsibility

Ad Astra Club: Astronomy Club of BITS Pilani

2023

President

- Leading and managing **50+** club members, effectively delegating responsibilities and fostering a collaborative environment.
- Hosted events such as **Chandrayaan 3 landing screening** which had over **1500+** attendees and Interactive Stargazing Sessions with our state of the art **9.25-inch diffraction-limited Schmidt-Cassegrain telescope**.
- Designing and executing projects such as: Building a **horn antenna** to prove the existence of dark matter and Building an Astronomy based **Cryphunt game: Galactrix**, for everyone to enjoy.

Volunteering

Exploring Neutron Star Mergers

2023

SEDS Antariksh, VIT Chennai

- Invited to be a **guest speaker**.
- **80+** attendees joined the talk on Neutron Star Merger, focusing on **GW170817**.

Website for Aspiring Astrophysicists

2023

Astrophysics by Atreyi

- Establishing a website as a **central resource** for **aspiring astrophysicists**, catering to all levels of learners.
- Curating career guidance, educational content, and cosmic exploration, fostering an inclusive community of learners.

Establishing an outreach program aimed at promoting Research

2024

Self-Run

- Establishing a network of institutions nationwide for outreach targeted at middle-school students.
- Curating a centralized hub of resources for students interested in taking research as a career path.

Github tutorials for radio astronomy

2023

Radio Astronomy Tutorials

- Made open source and accessible **GitHub tutorials** for data analysis in **Radio Astronomy**.
- Theory behind the concepts and the codes are provided.

Extracurricular Activities

Spectrum:The Physics Association

2022

Editorial Team

- Writing engaging articles on exciting topics in physics.

Mental Health Support Group (MHSG)

2022

Editorial Team

- Writing awareness articles on mental health issues.

BITS Pilani, Hyderabad Campus

2023

Science Day and Teacher's Day

- Main singer in both the events in college

Into the Cosmos: A beginner's guide

2022- ongoing

Atreyi Dasgupta

- Writing a book on a basic guide to Astrophysics for beginners in the field.