

# SASI MITRA BEHARA

beharasasimitra211141@students.iisertirupati.ac.in | sasimitra.b@hotmail.com |

I am a Third-Year BSMS Student at Indian Institute of Science Education and Research, Tirupati, majoring in Physics. I have strong programming skills and I enjoy exploring Astrophysics. I aim to become a researcher in Astrophysics, with a focus on the applications of Computational Tools in Astrophysics. I have a creative and Analytical Mind, Very Adaptable, and I am always eager to learn New Skills

---

## EDUCATION

### Class 4 – Class 12 | Sri Sri Ravishankar Vidya Mandir (Bangalore North)

2012 - 2021

- Graduated Class 10 with 82%
- Graduated Class 12 with 91%

### BSMS in Physical Sciences Majoring in Physics | Indian Institute of Science Education and Research, Tirupati

2021-Present

- Current CGPA: 8.0/10
  - Relevant Coursework:
    - **Physics:** Classical Mechanics, Quantum Mechanics (I & II), Electrodynamics, Fluid Dynamics, Non-Linear Dynamics, Statistical Physics, Astrophysics, Introduction to Earth and Climate Science
    - **Mathematics:** Set Theory, Linear Algebra and Applications, Single and Multivariable Calculus, Real Analysis, Probability and Statistics, Introductory Group Theory
    - **Computer Science:** Introduction to Programming (Python), Introduction to Algorithms
- 

## EXPERIENCE

### Python Instructor | Naxxatra Sciences

2021-2022

Instructor for Naxxatra's Python for Research online course. Taught various concepts such as Numpy, Pandas, and Pygame for a small batch of 6 students in Online Mode.

### Summer Intern | Asteroseismology | IIT (BHU)

May 2023 – June 2023

Utilized BASTA, a tool developed by my mentor, Dr Kuldeep Verma, to constrain Stellar Parameters using Asteroseismic Data. In my internship, I analyzed six stars observed by the K2 Mission, employing BASTA and GlitchPy tools. In the process, I acquired a solid foundation in Stellar Structure and Evolution, as well as Principles of Asteroseismology and Bayesian Methods.

### Summer Intern | Astrophysics

May 2023 – July 2023

In my internship, I modelled the mass of two TypeII supernova progenitors by measuring the [OI] Flux data, under the mentorship of Dr. Subash Bose. I learned about the stellar processes leading to supernovae, and delved into the analysis of spectra emitted by late-stage supernovae in their nebular phase. I developed and implemented Python Code to measure the progenitor mass of SN2017eaw, and used the same techniques to constrain the mass of ASSASN15nx.

---

---

## PROJECTS

### Basic Ideal Gas Simulation

- Implemented a 3D particle simulation in Python using Numpy and optimized performance with Just-In-Time compilation (Numba), and Fortran and C Routines
- Developed a Collision Algorithms for Elastic interactions between the particles and between the particles and the walls.
- Created Visualizations using matplotlib, generating Frame-By-Frame animations for system Analysis
- Applied Object-Oriented code principles for modular and reusable code design

### Galaxy Rotation Curve of NGC5921

- Used Common Astronomy Software Applications (CASA), a tool developed by the NRAO to Synthesize an image in 21cm emissions using the data from VLA.
- Used the redshift on the 21cm Emission line to calculate the Galaxy Rotation curve

### iGEM IISER Tirupati's Wiki

- Contributed as a Wiki Developer to the 2022 and 2023 iGEM IISER Tirupati teams.
- Used tools such as HTML, CSS and Javascript, along with open CSS frameworks like Bootstrap and W3CSS to build the wiki
- The 2022 and 2023 Teams were awarded Gold Medals.
- The wiki can be viewed at: <https://2022.igem.wiki/iiser-tirupati-india/index.html> <https://2023.igem.wiki/iiser-tirupati-india/index.html>

### Web Portal for DeePNAP

- DeePNAP is a machine learning-based model trained on a vast and heterogeneous dataset with 14,401 entries (from both eukaryotes and prokaryotes) of ProNAB database, consisting of wild-type and mutant PNA complex binding parameters.
- Contributed making the Web Application for the end user to interact with the model.
- The preprint article can be found at bioRxiv at: <https://www.biorxiv.org/content/10.1101/2023.12.03.569768v1>

### Deriving the Period-Luminosity relation for Cepheid Variable Stars

- Leavitt Law: Describes a direct relationship between the Period and Luminosity of Cepheid Variable Stars.
- Used Astroquery to query data from ASSA-SN and Gaia Catalogues of Stars.
- Used Python for Data Analysis and plotting and drew relevant conclusions.
- Consulted Relevant Research papers to check the validity of our conclusions.

### Estimating the Resident Stars of the Open Clusters NGC2345 and Berkeley 59

- Applied Clustering Algorithms to estimate the resident stars of the open clusters.
- Used data available from the Gaia Mission along with the Polarization data collected by Panopoulou et al (2023)
- Used Astroquery to query the relevant data of the stars of interest and applied clustering algorithms in python.
- The report for this project can be found at: <https://drive.google.com/file/d/1TjeNoBpMwQeUL3DuQZPfJpcd-aNAdiBu/view?usp=sharing>

---

## SKILLS

- Python, and Python Packages (Numpy, Pandas, Matplotlib, Flask, Numba, Astropy, etc)
  - LaTeX
  - Web Development using HTML, CSS and Javascript
  - 2d Animations in Powerpoint
  - Basic Video Editing in DaVinci Resolve
  - Numerical Methods in Programming
  - Common Astronomy Software Applications (CASA)
  - Basic knowledge of Julia, C and Fortran
  - Query Languages; Astroquery and MySQL
  - Arduino
  - Languages: English, Telugu, Hindi, Kannada, Sanskrit
-

---

## EXTRACURRICULARS

### Club Work:

- Co-Founder and Coordinator of the Coding Club of IISER Tirupati
- Helped organize the Aethereum Workshop at Celestic, the IISER Tirupati Astronomy Club
- Taught beginners to Solve the Rubik's Cube at Polyhedron, the IISER Tirupati Cubing Club
- Delivered Student talks at the Math Club, Celestic, Polyhedron, and the Coding Club of IISER Tirupati.

## ONLINE COURSES AND WORKSHOPS

### Online Courses:

- *Data Driven Astronomy* – University of Sydney, Coursera
- *Analyzing the Universe* – Rutgers University, Coursera
- *Intro2Astro* Online Workshop
- Data Carpentry course on *Foundations of Astronomical Data Science*

### Workshops Attended

- *LIGO India Data Analysis Workshop* conducted at IISER Tirupati for Aethereum 2022
- *Radio Astronomy Summer Program, 2022*, organized by Naxxatra Sciences
- *Beginning Astronomy V3: Start a Data-Driven Journey*, organized Jointly by IUCAA and IIT Hyderabad