Sachin Venkatesh Thakku Saravana

Mail | Google Scholar | Website

Research Interests
Computational Astrophysics & Cosmology, Big Data, Machine Learning, Artificial Intelligence, High Performance & Parallel Computing, Financial Modeling, Instrumentation

Education

Northwestern University
PhD Physics (Advisor : Alexander Tchekhovskoy) expected 2028-29

Georgia Institute of Technology
PhD Physics (Advisor : Matthew Liska) Transferred
MS Physics May 2025
MS Computational Science and Engineering May 2025

Delhi Technological University
B.Tech Engineering Physics May 2022

Publications

Shubham Bhardwaj, Maria G Dainotti, **Sachin Venkatesh**, Aditya Narendra et al. (2023). '**GRB optical and X-ray plateau properties classifier using unsupervised machine learning**' MNRAS, Volume 525, Issue 4, November 2023, Pages 5204–5223

Sachin Venkatesh and Gaurav Pundir (2022). '**PERISTOLE: Package That Generates Time Delay Plots Caused by Gravitational Lensing**' Res. Notes AAS 6 255

Sachin Venkatesh, Pratyush Bhatt et al. (2021). 'A **comparative study of various Deep Learning techniques for spatio-temporal Super-Resolution reconstruction of Forced Isotropic Turbulent flows**', IMECE2021-69923 [Talk + Proceedings]

Work Experience

Graduate Researcher Jun'25 - Present
Northwestern University Dr. Alexander Tchekhovskoy
- Addressing Physics Informed ML acceleration for H-AMR aided by GenAI
- Inclusion of analytical spacetime metric for binary black hole simulations in H-AMR

Graduate Researcher Sept'23 - May'25
Georgia Institute of Technology Dr. Matthew Liska
- Developing Physics Informed ML models for H-AMR to increase simulation resolution and reduce computational cost

Research Intern May'22 - Aug'23
National Astronomical Observatory of Japan Dr. Maria Dainotti
- Clustering Gamma-Ray Bursts from Swift-BAT, BATSE and other datasets on the basis of prompt parameters using Gaussian Mixture Model and Bayesian Information Criterion

Data Engineer Jul'22 - Jun'23
Genpact
- Data Engineer (+ Fullstack) focusing on big data and scalable datalakes for high density businesses and processes using Snowflake, SQL, and PySpark

Summer Intern May'21 - Aug'21
Center for Computational Astrophysics
- Studied dark matter halos and their properties using IllustrisTNG. Explored ML algorithms and their limitations on merger trees to detect self-similarity across branches

Undergraduate Researcher - Fluid Mechanics Group Feb'20 - May'22
Delhi Technological University Dr. Raj Kumar Singh
- Student leader - theoretical research in Computational Fluid Mechanics and ML; Developed and compared various super-resolution algorithms to reconstruct high-fidelity turbulent flows from low resolution data

Research Intern May'20 - Jan'21
Indian Institute of Astrophysics Dr. Jayant Murthy
- Modeled dust scattering and halos using GALEX data to explore the evolution and nucleosysnthesis of O and B type stars, and the effect of cosmic dust on scattering and star formation rates

Teaching Experience

Intro Physics II (Phys2212) Fall'23, Spring'24, Summer'24
- Tutored 150 undergrads for a calculus-based course with electromagnetism and it's applications

Skills

- **Languages**: Python, JAX, R, SQL, Teradata, Snowflake, Flask, C/C++, LaTeX, Git, Bash
- **Platforms**: Linux, Windows, HPC, CUDA
- **Software**: SAO-DS9, COMSOL, MATLAB

Awards and Honors

IAU symposium 377 monsoon school scholarship recipient	2023
Honorable Mention by ASME for work in 'Applied ML' presented at IMECE	2022
Delhi University IoE grant for establishing radio astronomy lab (INR 800,000)	2022
Special mention by DeepAI for novel work in super-resolution	2021
Scipy and PyData Global Impact scholar	2021, 2022

Conferences and Workshops

- **OpenSKAI conference**, SKAI Northwestern — Sept'25
- **IAIFI Summer school and workshop**, Harvard and MIT — Aug'25
- **PEARC : Systems and Systems Software** [Reviewer] — May'25
- **Cosmology and galaxy astrophysics with simulations and ML**, Flatiron Institute — Dec'24
- **Code/Astro - Astronomy software development**, Northwestern University — July'24
  - Mentor and TA (parallel programming)
  - Developed python package PERISTOLE 10.5281/zenodo.6744000 — 2022
- **IAU symposium 377 conference and monsoon school** — Feb'23
- **European Astronomical Society Annual Meeting 2021** [Volunteer] — July'21