Pranav Satheesh

Undergraduate Student · BS-MS Physics Dual Degree Program

Indian Institute of Technology Madras, Chennai 600036, India

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Education

Indian Institute of Technology Madras — *Chennai,India*

BS-MS Dual Degree, Physics — *2017- present*

- **CGPA**: 9.17/10

Central Board of Secondary Education

Senior Secondary School — *2015-2017*

- **Percentage**: 94.7

Central Board of Secondary Education

High School — *2013 - 2015*

- **CGPA**: 10/10

Relevant Coursework

- General Relativity and Cosmology
- Advanced General Relativity
- Computational Physics
- Statistical Physics
- Classical Mechanics
- Quantum Mechanics
- Advanced Particle Physics
- High Energy Physics
- Classical Field Theory

Projects & Research Experience

Ready-to-use eccentric templates including non-quadrupole modes

Advisor: Dr. Chandra Kant Mishra, IIT Madras — *Aug. 2019 - Present*

- We focus on developing waveform models for binary black hole inspirals that account for the eccentricity of the orbit. We use the stationary phase approximation and extend it to non-quadrapole moments to develop a ready-to-use fully analytical waveform model. .

Polarimetric method for predicting the gravitational wave polarization of LISA verification binaries.

Advisor: Prof. Prasenjit Saha, University of Zurich — *Summer 2020*

- Verification binaries are strong gravitational wave sources and fall within the LISA band. We are developing a method to predict the various orbital parameters of such binaries using an optical polarimetric method. Our work focuses on the AM CVn type star: HP Librae.

Searching for astrophysical signals in LIGO O1/O2 data

Advisors: Prof. Rajesh Nayak, IISER Kolkata — *Summer 2019*

- The project involved learning the basics of gravitational waves data analysis and parameter estimation and the theory behind sources of gravitational waves.

SWAN Radio telescope

Supervisor: Prof. Suresh Govindarajan, IIT Madras — *Summer 2018*

- SWAN(Sky Watch Array Network) is a collaborative project by Raman Research Institute, Bangalore and many national institutes. I learned pulsar observation and data analysis and radio interferometry through a hands on session program at Gauribidanur radio observatory, Bangalore

Publications

In Preperation

P. Satheesh, C.K. Mishra,. 2021. *Ready-to-use eccentric templates including non-quadrupole modes*

Scholarships and Achievements

Selected for the **ThinkSwiss Research Scholarship** funded by the State Secretariat for Education,Research and Innovation (SERI) and is supported by Swissnex India

INSPIRE Scholarship by the Department of Science and Technology of Government of India which is offered to bright students of natural sciences.

Conferences & Workshops

Contributed Presentations

P. Satheesh,P. Saha,H. Schmid,. 2021. *A spectropolarimetric method for predicting the gravitational wave polarization of LISA verification binaries*. i-poster presentation: **237th meeting of the American Astronomical Society**.

P. Satheesh.2020.*Frequency Domain Gravitational Waveform Modelling for Eccentric Black Hole Binaries*:. **RAS Early Career Poster Exhibition 2020**

Conferences/Workshops Attended

April 2021. *BitGrav21 meeting*

October 2020 *Mathematical and Computational Approaches for Solving the Source- Free Einstein Field Equations*, ICERM

September 2020. *Physics of the Early Universe- An online Precursor*, ICTS

June-July 2020. *Code Astro 2020*, Worked on a Python package during the hackathon

May-June 2020. *Gravitational Wave Astrophysics summer school 2020*, ICTS

Outreach & Extracurricular

Service and Outreach

2019-20	**Horizon: The Physics and Astronomy Club of IIT Madras**, Head
Jan 2020	**Shaastra 2020**, Workshop trainer for the workshop on *Analysis of Globular Clusters Using Colour-Magnitude Diagrams*

Professional Memberships

American Astronomical Society *Undergraduate Member*

Technical Skills

- **Programming Languages** : Python, C, C++
- **Software tools** : Mathematica,SAO DS9 (astronomy)
- **Specific Python packages**: PyCBC, Astropy