

# SWETA SETHI

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in Sweta Sethi

🌐 sweta-sethi12.github.io

📝 Research blog

## EDUCATION

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### 📅 2018-PRESENT

Indian Institute of Science Education and Research, Berhampur, India

*(Recognised as Institute of National importance by Govt. of India)*

### 📅 2015-17

**Grade 12:** Buxi Jagabandhu English Medium School, Bhubaneswar, India

## RESEARCH INTEREST

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Model gravitational waveforms using analytical methods and numerical relativity to detect gravitational waves from compact binary mergers.

## RESEARCH EXPERIENCES

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### Master's thesis student | Gravitational wave Astrophysics

📍 Indian Institute of Science Education and Research, Kolkata, India

📅 June 2022-Present

I am doing my Master's thesis with Professor Rajesh Kumble Nayak, IISER Kolkata. In my work, I demonstrate that the inclusion of higher modes of gravitational radiation, which vibrate at higher multipoles of the orbital frequency than the dominant modes, shows a significant improvement in the recovery of the binary black hole parameters as well as the reduction of the false alarm rate using particle swarm optimization.

### Summer school student | Gravitational wave Astrophysics

📍 International Centre for Theoretical Sciences, Bengaluru, India

📅 May-June 2022

I was an on-campus Gravitational-wave Astronomy summer school participant. We were taught about Stellar structure, evolution, collapse, and supernovae by Professor Bernhard Müller; Compact binary evolution, rates, and population modeling by Professor Christopher Berry, followed by tutorials, team project work, and presentation. My team worked on Modules for Experiments in Stellar Astrophysics (MESA) where we evolved a binary star up to core carbon burning and then developed a population of stars to compute the properties of the compact object remnants. The second project was based on the inclination angle of the binary black hole mergers where we tried to answer some of the open questions.

### Student researcher | Gravitational wave Astrophysics

📍 Indian Institute of Technology, Madras, India

📅 January-May 2022

I went through the various tools in Gravitational-wave Astrophysics like Fisher's information matrix, which is required to find the uncertainties that are obtained when estimating the parameters for the compact binary coalescences, under the guidance of Professor Chandra Kant Mishra.

### Winter Intern | Gravitational wave Astrophysics

📍 Indian Institute of Technology, Madras, India

📅 December 2021- January 2022

I worked under Professor Chandra Kant Mishra, learned about parameter estimation of binary black hole mergers, and analyzed the modified data after injecting a numerical waveform into the actual detector data. I did the parameter estimation for GW191222-033537 and then made a self-injection and recovery using IMRPhenomD at an inclination of 60 degrees and observed how the inclination angle affects the parameter estimation. The goal of the internship was to learn about Bayesian inference and see how it is applied to study GW from compact binary coalescence.

### Summer School Student | Astrophysics

📍 Inter-University Centre for Astronomy and Astrophysics, Pune, India

📅 May-June 2020

Here we were introduced to various fields of Astronomy and Astrophysics. It started with a brief introduction of the fundamentals and the recent developments in each field. Unfortunately, the pandemic made it impossible to carry out an individual project under the professor.

### Research Intern | Quantum Computing

📍 Indian Institute of Science Education and Research, Kolkata, India

📅 February-April 2020

I worked under the supervision of Prof. Prasanta K. Panigrahi and Bikash Kumar Behera, a Ph.D. student on the topic of Quantum Computation. Here, I modeled and analyzed the code for 'Quantum Simulation of Lattice Protein Models Using Quantum Annealing', which can be used to determine large protein structures based on sequence information.

## PUBLICATION

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1. R. Raj, **S. Sethi**, B. K. Behera, and P. K. Panigrahi, [Quantum Simulation of Lattice Protein Models Using Quantum Annealing](#) DOI:10.13140/RG.2.2.34260.55687 (📅 2020), [[LINK](#)]

## SCIENCE WRITING AND COMMUNICATION

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- Run a personal Physics blog, **Physics 'O' Wizards**, where I summarize Astrophysics papers mostly related to General Relativity, gravity and Gravitational waves.
- Co-author and editor at **Jigyansa** an **Odia** science communication platform, which involves a team of students who write and edit science summaries aimed at undergraduate students interested in learning more about the latest research in the field of science and technology. (📅 March 2021-Present)

### Outreach Activities:

- \* **N2020-NOX-1IB:** Co-organized an Astronomy outreach during the pandemic, where more than 300 school students from grades 9-11 participated in a two-week long program of presentations, quizzes, and fun activities. I gave a presentation on 'Are we Alone in the Universe?'
- \* **STREAM:** An annually organized outreach for school students from Berhampur, where we offer them visualization, hands-on experience to the topics they covered in their school. My team was working on Gravitational waves.

## TECHNICAL SKILLS

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- \* Programming languages: Python
- \* Computer aided softwares: IBM Q, Qiskit, Pan-STARRS, SAO ds9
- \* Others: Linux (Ubuntu), Windows OS

## LANGUAGES

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- \* Odia: Fluent
- \* Hindi: Fluent
- \* English: Proficient
- \* Bengali: Limited working proficiency

## REFERENCES

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1. **Dr. Rajesh Kumble Nayak**  
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Center of Excellence in Space Sciences, India (CESSI),  
Indian Institute of Science Education and Research, Kolkata. ✉ [rajesh@iiserkol.ac.in](mailto:rajesh@iiserkol.ac.in)
2. **Dr. Sandeep Chatterjee**  
Assistant Professor, Department of Physical Sciences,  
Indian Institute of Science Education and Research, Berhampur. ✉ [sandeep@iiserbpr.ac.in](mailto:sandeep@iiserbpr.ac.in)
3. **Dr. Md Nasim**  
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