

## EDUCATION

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### IISER Kolkata

BS-MS Dual Degree program (Major in physics)

Mohanpur, West Bengal

2021–2026(expected)

- Current GPA:9.44/10
- Master’s Thesis: “From Amplitudes to Astrophysics: A Novel Framework for Gravitational Dynamics and Other Scattering Problems in Astrophysics”

### Burdwan Municipal High school

Higher Secondary schooling

Burdwan, West Bengal

2019–2021

- secured 98.4% (492 out of 500) and ranked 8th in state West Bengal out of 0.7 million students.

## MS THESIS:

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### Gravitational physics from amplitudes:

Jan 2025–Present

- “From Amplitudes to Astrophysics: A Novel Framework for Gravitational Dynamics and Other Scattering Problems in Astrophysics”
- Supervisor-Prof. Arnab Rudra (Strings group IISER Bhopal), Co-supervisor- Prof. Koushik Dutta(IISER Kolkata)
- Working on modeling the dynamics and radiation of gravitationally and electromagnetically interacting general compact stars using scattering amplitudes. We are focusing on computing classical observables like momentum kick, spin kick, scattering angle, and radiated momenta.

## SCHOLARSHIPS AND AWARDS

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- **Qualified Kishore Vaigyanik Protsahan Yojana (KVPY) Examination 2021**, DST-funded national scholarship for excellence in basic sciences. Secured an all-India Rank of 21 (General Category) out of around 5K candidates and 46 offered scholarships.
- **Qualified JBNSTS Senior Fellowship-2021**, Awarded to top 60 STEM undergraduates in the state of West Bengal, out of approx 6k applications.

## ACADEMIC ACHIEVEMENTS

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- **Ranked 40** out of approx 19,525 students nationwide in GATE(Graduate Aptitude Test in Engineering) 2023, an entrance examination conducted in India for admission to science and technical postgraduate programs.
- **Ranked among the 250** out of approx 29,000 students nationwide in CSIR-NET(National Eligibility Test) 2023, an entrance examination conducted in India for admission to basic science research programs.
- **Ranked among the top 25** out of approx 15,000 students nationwide in NGPE(National Graduate physics exam) 2023, conducted by the Indian Association of Physics Teachers(IAPT).
- **Qualified JEE-Main** ( Indian standardized test for admission to various technical undergraduate programs in science and engineering across colleges and institutions in India), **percentile -99.27**, All India Rank-7652 among 1.6 million candidates.

- **Qualified JEE-ADVANCED** (Entrance examination for IIT ) All India Rank-7842, among 0.3 million candidates selected through JEE-MAIN.
- **Secured 8th rank(out of 0.7 million students)** in West Bengal in 10+2 Board Examination(Higher Secondary Examination)
- Selected for BS-MS program at IISER through IAT(IISER Aptitude Test), secured **All India Rank – 16** in IAT(out of approx 30k candidates )
- Selected for B MATH program at ISI Bangalore (All India Rank -68 out of 50k students)

## TEACHING EXPERIENCE:

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| • <b>Teaching Assistant</b> at IISER Kolkata<br><i>Waves and optics(PH2101)</i>                      | Autumn 2025 |
| • <b>Teaching Assistant</b> at IISER Kolkata<br><i>Introduction to Computer Programming (CS1101)</i> | Autumn 2025 |
| • <b>Teaching Assistant</b> at IISER Kolkata<br><i>Thermal Physics (PH2202)</i>                      | Spring 2025 |

## RESEARCH EXPERIENCE:

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| <b>Quasi-normal modes of Black Holes in non-static environment</b>   | Kolkata,India<br>August 2024-July 2025 |
| <ul style="list-style-type: none"> <li>– Supervisor- Prof. Rajesh Kumble Nayak</li> <li>– Studied the effects of a non-asymptotically flat background on relativistic stars (via TOV equations), black holes(via Teukolsky equation), and its implications on the quasi-normal modes of BH and <math>w</math>-modes of stars.</li> </ul> |  |

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| <b>Improving Bayesian inference to estimate 21-cm signal parameters in cosmology</b>  | Kolkata,India<br>August 2025-Present |
| <ul style="list-style-type: none"> <li>– Supervisor- Dr. Raghunath Ghara</li> <li>– Investigating Bayesian inference methods for analyzing the 21 cm hydrogen signal, focusing on reducing prior dependence and assessing its impact on current IGM constraints from LOFAR observations.</li> </ul> |                                      |

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| <b>Estimating Distance and Time Period of the Vela Pulsar</b>  | Kolkata,India<br>Spring 2025 |
| <ul style="list-style-type: none"> <li>– Group project for Space Astronomy(SS4202)</li> <li>– Analyzed Ooty Radio Telescope data using Python modules (NumPy, SciPy, FFT). Estimated pulsar dispersion measure and period with signal processing and dedispersion techniques.(Report :<a href="#">CLICK HERE</a>)</li> </ul> |                              |

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| <b>Topology and geometry in QM and Anomalies in QFT</b>  | Bhopal , Madhya pradesh<br>Summer 2024 |
| <ul style="list-style-type: none"> <li>• Supervisor-Prof.Arnab Rudra (Strings group, IISER Bhopal)</li> <li>• Investigated discrete symmetries in condensed matter with a focus on Symmetry-Protected Topological (SPT) phases of matter and geometric interpretations. Explored fermionic t’Hooft anomalies using group extension methods, developing rigorous mathematical formulations starting from toy models such as a particle on a circle with a topological -term.</li> </ul> |  |

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| <b>Neutrino Oscillation:Theory and Observation</b>  | Kolkata<br>Summer 2023 |
| <ul style="list-style-type: none"> <li>• Supervisor: Prof Amitava Raychaudhuri, University of Calcutta</li> </ul> |                        |

- Conducted a thorough review of Boris Kayser's article on neutrino oscillation. Surveyed literature on long-baseline facilities (DUNE, Hyper-Kamiokande) and potential studies at INO, and am extending the project to reactor antineutrino phenomenology and accelerator-driven long-baseline experiments. (Report :[CLICK HERE](#))

## Travelling Salesman Problem in Hopfield neural network

Indore, Madhya Pradesh

Summer 2023

- Mentor: Manoranjan Singh, RRCAT, Co-mentor: Praveen Pathak, HBCSE, Mumbai
- Implemented Hopfield networks for combinatorial optimisation (e.g., TSP), proposing a modified Hamiltonian connecting to a 2D Ising model with perturbative corrections..

## SEMINARS AND WORKSHOPS:

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### NIUS 19.1 camp

HBCSE,Mumbai

Mumbai,India

Dec-2022

- Was selected for National Initiative on Undergraduate Science (NIUS). NIUS, hosted by TIFR, Mumbai, selects 50 top undergraduate students for research projects with professors around India. The offline camp includes lectures on current-day fields of research in physics, experimental problem-solving sessions on previous International Physics Olympiad problems, and other such activities.

### JBNSTS Astronomy camp

JBNSTS,Kolkata

Deoul ,West Bengal

Feb-2023

- In this camp, we got to explore observational astronomy, telescope handling and observation of stellar constellations. In addition, we had a special solar observation and an informal astronomical photography session.

### REYES 2023,UC Berkley

Summer 2023

- REYES(Remote Experience for Young Engineers and Scientists)-2023 is an eight-week summer school organised by University of California, Berkley in virtual mode.

### QIQT 2023

IISER Kolkata

Summer 2023

- Summer workshop in IISER Kolkata focusing on Quantum Optics, Quantum Chemistry, Quantum Foundation, and Quantum Materials

### Undergrad Vision: Young Physicists' Symposium

IISER Kolkata

August 2024

- Presented my summer work on 'Particle on ring' in "undergrad vision: Young physicists' symposium " organised by Gluon, Physics club, IISER Kolkata, and also served as a part of the student organizing committee.

## SKILLS

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- **Programming Language and Frameworks:** Python, Mathematica, Matlab, HTML, Javascript
- **Developer Tools:** VS Code, Jupyter Notebook, Anaconda
- **Packages:** NumPy,SciPy,SymPy, matplotlib,Tensorflow(Python),XACT(Mathematica)

## INTERNATIONAL STANDARDIZED TESTS:

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### ETS TOEFL-iBT

Sept 6,2025

- Total - 106/120 :**Reading**-29 ; **Listening**-25 ; **Writing**- 27 ; **Speaking**- 25

## LANGUAGES

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- **Bengali:** Native proficiency
- **English:** Full professional proficiency
- **Hindi:** Full professional proficiency

## EXTRACURRICULAR ACTIVITIES

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- Core-Committee of GLUON 2024 Aug–2025 Jun  
*Served in the Core Committee of 'GLUON', Physics club of IISER Kolkata. Organised 'Undergrad Vision: Young Physicists' Symposium, a unique event only for undergrad and master's students to present their research work, where we coordinated 12 talks in 2 days. Hosted 20+ talks by alumni, current students, and professors in my tenure .*
- Member at Badminton club IISER Kolkata  
*Participated in Badminton Auction tournament-2025*
- Member at Lit Club IISER Kolkata  
*Avid reader of Bengali and English literature; passionate about classic fantasy series (Harry Potter, Percy Jackson, A Song of Ice and Fire). Also enjoy anime ('Bleach', 'Demon Slayer', 'Naruto') and manga.*