

SAQLAIN AFROZ

BS-MS 4th Year

Department of Physical Sciences (with a minor in CS)

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My Website



PROJECTS AND EXPERIENCES

Working in CESSI (Gravitational Wave Astrophysics)

Under Dr. Rajesh Kumble Nayak

January 2022 – Present IISER Kolkata

- Accessing LIGO data, Post Processing LIGO data, generating waveforms in the time domain and frequency domain
- Q-transform
- Physics and Astronomy of coalescence
- Definition of matched filtering, the assumptions made with white noise and matched filtering with non-Gaussian data
- Parameter estimation of sources from gravitational wave, by using bilby python module
- I have gained a good understanding of some python modules and these are gwosc, gwpy, pycbc, astropy, numpy, pandas, bilby
- I have also got to know about a Convolutional Neural Network (CNN) which can help in parameter estimation and can do the job within seconds whereas the classic ways would take minutes and hours. And I am working to improve the model.

Application of the Cubed-Sphere Grid to Black-Hole Accretion Disks

Under Prof. Sudip Kumar Gorain

August 2023 – Present IISER Kolkata

- I have used Fortran to write a program to generate a cubed sphere that will help us solve the partial differential equation on the grid. This helps in preventing the singularity created at pole while using spherical polar coordinates.
- This allows an efficient implementation on massively parallel architectures.

Quantum Computation

Under Prof. Prasanta K. Panigrahi

December 2022 – April 2023 IISER Kolkata

- This was a reading project where I had to read the research papers and write a review on them.
- Quantum Simulation of Hawking Radiation Using VQE Algorithm on IBM Quantum Computer.
- Cosmological Simulations of Dark Matter on Quantum Computers.

Term paper for my Advanced Quantum Mechanics Course 2023

IISER Kolkata

- I have written a term paper on the topic 'Klein's paradox in Graphene P-N Junction' under the supervision of Prof. Sourin Das.

Machine Learning Project

Under Prof. Kripabandhu Ghosh

November 2022 – April 2023 IISER Kolkata

CERTIFICATES

UP Science Talent Search Examination Scholarship Holder 2016 [Cert.](#)

GWOSC Workshop 5 2022 [Cert.](#)

Quantum Information and Quantum Technology An International Conference, hosted by IISER K in 2023 [Cert.](#)

Qiskit Global Summer School 2022 [Cert.](#)

Participated in LIMIT 2021 An International Mathematics Competition, by ISI, Bangalore. [Cert.](#)

NCC Special Trophy Air Wing [Cert.](#)

TOOLS

Python ●●●●●

C/ C++ ●●●●●

Julia ●●●●●

Linux ●●●●●

Latex ●●●●●

Fortran ●●●●●

Parallel Computing ●●●●●

Qiskit ●●●●●

EDUCATION

UP Sainik School, Lucknow
83% in CBSE

BS-MS 4-th Year (8.19 CGPA, ongoing)
IISER Kolkata, 2020-2025

- The project was to use ML techniques to classify clauses from contracts which will help reduce lawyers workload.

Coding

Codechef

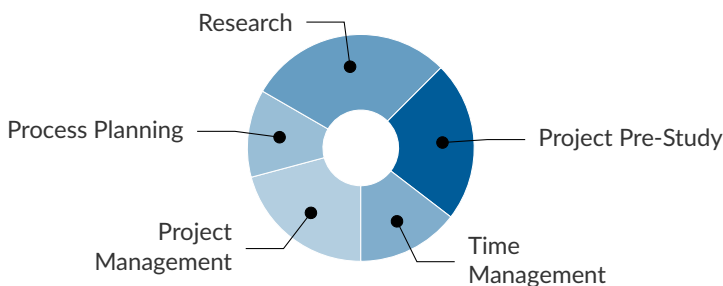
Jan 2020 – Present

- I learnt C++ and C mainly by solving problems given on these websites like codechef etc.
- I have had many sessions on platforms like codechef.
- Participated in various hackathons, some organised by codechef and some organised by institutes like NISER and IISc.
- I also have experience in scientific coding, which involves data analysis and modelling dynamics of the system in Python, Fortran and Julia.

RESEARCH INTERESTS

- **Gravitational Wave Astrophysics:** I am fascinated by the direct detection of cosmic events like black hole mergers, offering a new way to explore the universe.
- **Cosmology and Black Hole Physics:** The enigmatic nature of black holes, their role in cosmic structures, and their potential to challenge our understanding of physics at the most extreme scales intrigue me immensely.
- **Quantum Computation:** I am enthusiastic about harnessing the power of quantum mechanics to solve complex problems and revolutionize computing.
- **Dark Matter and Dark Energy:** Eager to uncover the mysteries behind the invisible forces shaping the universe's fate.
- **Particle Physics and Cosmology Connection:** I am drawn to the bridge between the smallest particles and the vast cosmos, revealing fundamental truths.
- **Quantum Gravity:** Aiming to unify the theories of general relativity and quantum mechanics, paving the way for a deeper understanding of the universe's fundamental laws.

OVER-ALL EXPERIENCE



HOBBIES

- Coding
- Scientific Programming
- Painting
- Guitar
- Photography
- Star Gazing
- Traveling
- Cooking
- Chess
- Athletics
- Cubing

RELEVANT COURSES

- Introductory Astrophysics
- Quantum Field Theory
- Classical Mechanics & Special Theory of Relativity
- Quantum Mechanics (Beginner, Intermediate and Advanced)
- Mathematical Methods I, II
- Condensed Matter Physics
- Electricity and Magnetism
- Waves and optics
- Thermal Physics
- Statistical Mechanics
- Non-Linear Dynamics
- Real Analysis
- Linear Algebra I
- Probability I
- Electrical Circuits and Electronics
- Programming and Data Structures I
- Nuclear Physics Laboratory
- Optics Laboratory
- Mechanics Laboratory
- Natural Language Processing

MOOCs

From Big Bang to Dark Energy

[The University of Tokyo](#)

Coursera

Particle Physics: An Introduction

[University of Geneva](#)

Coursera

Radio Astronomy

[By Prof. Abhirup Datta](#)

IIT Indore, NPTEL

Introduction To Astrophysical Fluids

[By Prof. Supratik Banerjee](#)

IIT Kanpur, NPTEL

STRENGTHS

- Hard-working
- Eye for detail
- Communication
- Computation
- Creative
- Leadership