Tanya **Garg**

Quantum Information Science Enthusiast

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"Always walk through life as if you have something new to learn and you will"

Summary

A third year undergraduate student interested in solving problems in quantum information science. Experienced in quantum computation, quantum algorithm and communication with noise models, quantum machine learning and quantum simulation along with the fundamentals of physics.

Education

Indian Institute of Technology, Roorkee — *Roorkee, India*

B.Tech in Engineering Physics — *June 2018 - May 2022*

- CGPA: 9.398

The Cathedral and John Connon School — *Mumbai, India*

Grade 12(ISC) — *2018*

- Percentage: 98.5%

The Cathedral and John Connon School — *Mumbai, India*

Grade 10(ICSE) — *2016*

- Percentage: 95.2%

Experience

Harish-Chandra Research Institute — *Allahabad,India*

Research Intern — *Jul. 2020 - Present*

- Research internship under the guidance of Prof. Arun K Pati.
- Working on implementing noise models: phase flip, bit flip on the Probabilistic Quantum Teleportation Protocol
- Implemented and extended papers on teleportation using MATLAB

Qiskit Global Summer School(IBM) — *Global(Online)*

Summer Student — *Jul. 2020 - Aug. 2020*

- A three-week intensive summer school organised by the qiskit community(IBM) on a global platform.
- The school focused on teaching a broad range of topics: from qubits and bloch sphere to quantum chemistry and superconducting qubits.
- Selected as a lab student and was able to implement several algorithms: Grover's algorithm, Shor's algorithm and Deutsch-Jozsa algorithms along with implementation of rabi waves.
- Participated and completed the qiskit final project based on the most ideal simulation of the LiH molecule using VQE.

Projects

Classification of Quantum Correlations and Channels — *India*

Project Member at Bose.X — *Sept 2020 - Present*

- Working on preparing a complete mathematical formulation and computational algorithm for the classification of different quantum channels and correlations in open systems.
- Utilities: Qiskit, Qutip

Classification of the MNIST dataset using VQC — *India(Online)*

Qiskit Challenge India Project — *Sept 2020 - Sept 2020*

- Implemented a classification algorithm using Variational Quantum Classifier to distinguish between the digits 4 and 9 from the handwritten MNIST dataset.
- Worked on making a custom feature map and variation circuit with different degrees of entanglement.
- Able to achieve an efficiency of 80.9%

Simulation of LiH molecule using VQE on Qiskit

Global(Online)

Summer School Project

Aug. 2020 - Aug. 2020

- Implemented the ideal simulation of the LiH molecule by varying the initial state, variational form, simulator backend, noise model and the mapping type.
- Able to achieve an efficiency of 98.3%

Ultra high power short laser pulses of 1550nm

Roorkee, India

Summer Project

Jun. 2019 - Jul. 2019

- Worked under the guidance of Prof. Vipul Rastogi, Department of Physics, IIT Roorkee, in the photonics lab.
- Worked on finding the pulse power, pulse duration and the intensity for the laser ablation of aluminium, copper and iron using 1550nm from a literature review.
- Compared the values of the threshold fluence for the above-mentioned metals at different pulse duration.

Solar Sails

Roorkee, India

Project at Srishti

Nov. 2018 - March. 2019

- Got to study and present the topic of Solar Sails (method of spacecraft propulsion) at Srishti 2019, the annual technical exhibition of IIT Roorkee , under the guidance of the Physics and Astronomy Club
- After a literature review, a poster was made and presented.

Honors & Awards

2020	**Qiskit Challenge India,** Team ranked in the top 10 from a pool of more than 500 teams
2019	**ENCORE Award,** Received the 2019 award given to 2nd yearites for excellence in all-round performance
2019	**IITR Heritage Excellence Award,** Received the 2019 award given to one student from each year for excellence in all-round performance
2018	**INSPIRE,** Eligible for the 2018 award for being in the top 1% of the ISC Board in Grade 12

Skills

Programming Languages	Python, JAVA
Packages and Environments	Qiskit, IBMQ Simulator, Qutip, Scikit-learn, Numpy, Mathworks MATLAB and Simulink
Utilities	Git, Linux Shell
Relevant Courses (online)	Introduction to Quantum Computing, Quantum Physics I and II, Understanding Research Methods Design and Analysis of Algorithm, Machine Learning
Relevant Courses (offline)	Mathematics-I (Linear Algebra and Calculus), Optimisation Techniques, Electromagnetic Theory, Quantum Mechanics, Quantum Computing, Mathematical Physics, Digital and Analog ELectronics

Extracurricular Activity

Athletics team, IIT Roorkee

Roorkee, India

Member and Joint Secretary since 2019

Jun. 2018 - Present

- Member and former Vice Captain of the team.
- A thrower. Participated in various tournaments at IIT Kanpur and member of the Inter IIT Contingent for 2018 and 2019.
- Won several medals including a bronze medal(among participants from 23 IITs) in shotput in Inter IIT 2019 held at IIT Kharagpur.

Kshitij: The Literary Magazine

Roorkee, India

Member and Co-ordinator since 2020

Aug. 2018 - Present

- The bilingual literary magazine of the campus of IIT Roorkee
- Aimed at promoting the literary culture among the students.
- Organised and performed at Eunoia 2019, the annual slam poetry event of IITR.
- Worked on various articles as a member of the English Editorial team.