

Krishna Gupta

Project student|Tata Institute of Fundamental research(TIFR)



Education

St. Stephen's College- Delhi, India

2022-2025 Bachelor of Science (Honours) Physics; CGPA: 8.6

St. Thomas School - Kanpur, India

2021-2022 Indian School Certificate(ISC): 98.25%

2019-2020 Indian Certificate of Secondary Education(ICSE):96.6%

Technical Skills

Programming Languages

Python, Java, HTML5 & CSS

Python Libraries

Matplotlib, Scipy, Pandas, Numpy, Turtle

Quantum Computing Software

Qiskit, Qiskit-metal, Qiskit-Dynamics, Qutip

Software Tools and Development Environments

AWR Microwave environment , Keysight ADS, Anyss HFSS, AutoCAD, LPKF software

Research Experience

Project Student- Quantum measurement and Control Laboratory (QuMac),
Department of Condensed Matter and Materials Science, TIFR, Mumbai, India.

Guide: Prof. Rajamani Vijayaraghavan (Pioneer of India's National Quantum Mission)

- Oct 25 **Designed a Coupled-Line Directional Coupler (6 GHz, -20 dB Coupling)**
- Performed **FEM simulations** to analyze and optimize S-parameters for desired coupling.
 - Developed the **PCB layout in AutoCAD** and **fabricated the circuit using an LPKF milling machine.**
 - Assembled and soldered microwave connectors for experimental testing and characterization.
- Sep 25 **Designed single- and four-transmon qubit chips in Keysight ADS**
- Analyzed quantum parameters (qubit/resonator frequencies, Quality factor, anharmonicity, cross-Kerr coupling, Purcell time) and optimized device structure.

- Aug 25 **Designed $\lambda/4$ and $\lambda/2$ transmission-line resonators (CPW & microstrip)**
- Performed EM simulations and analyzed S-parameters for critically, under, over coupled , and optimized structures for maximum Q-factor.
- Summer Intern** - Quantum Material Design Laboratory (QMD),
Department of Condensed Matter and Materials Science, TIFR, Mumbai, India.
Guide: Dr. Bahadur Singh
Project Title: Ab-initio Investigation of Structural and Electronic Properties of Materials
- Jul 25 **Analyzed bulk and monolayer MoS₂ using Density Functional Theory (DFT)**
- Designed **2D MoS₂** structure from the bulk unit cell.
 - Demonstrated indirect-to-direct band gap transition upon exfoliation, highlighting its suitability for optoelectronic devices.
- Jun 25 **DFT simulations with VASP on bulk Cu, NaCl, and Si**
- Analyzed band structures/DOS to classify them as metal, insulator, and semiconductor.
 - Gained hands-on experience in k-point path selection, pseudo potential choices (POTCAR), and convergence testing.

Certification [Link](#)

IBM Quantum Learning (Online), 2025:

Received badges for multiple foundational, intermediate, and advanced courses:

- **Basics of Quantum Information** – Learned quantum states, measurements, and entanglement.
- **Fundamentals of Quantum Algorithms** – Studied algorithms like Grover's and Shor's, and their classical vs quantum advantages
- **Quantum Machine Learning** – Explored quantum kernels and variational models applied to classification tasks.
- **Variational Algorithm Design** – Designed and tested VQE/QAOA circuits on Qiskit simulators.
- **Quantum Diagonalization Algorithms** – Learned techniques for Hamiltonian diagonalization and eigenvalue problems.

Semiconductor Technology & Microfabrication Workshop –

IISc Bangalore (Online), 2024

- Gained hands-on understanding of semiconductor fabrication flow.
- Learned key processes: oxidation, doping, lithography, etching, and epitaxial growth.
- Explored applications of cleanroom processes in device prototyping.

Honours & Awards

- 2022 Recognized as top **1% students** in the **ISC board examinations**.
- 2022-2025 Recipient of the INSPIRE scholarship, DST Government of India .
- 2022-2025 **3 Times-** Recipient of the **Sumitomo scholarship** for **academic excellence** by the **Sumitomo Corporation, Japan**