

# 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, Ansys 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 MoS<sub>2</sub> using Density Functional Theory (DFT)**

- Designed 2D MoS<sub>2</sub> 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**