Krishna Gupta

Project student|Tata Institute of Fundamental research(TIFR)

Github: Tranzmon

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Personal website: link

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 Circuit Pro

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)

Nov 25 **On-Chip Broadband Parametric Amplifier (BPA) for Quantum Readout (Ongoing)**

- Upgrading PCB-based BPA to silicon for scalable, multiplexed superconducting qubit readout.
- Optimized CPW transmission-line geometry using FEM simulations to maximize bandwidth across the desired frequency range.

Hands-on Experimental Experience with Superconducting Qubit Systems

- Assembled qubit–cavity system and integrated waveguides for microwave signal routing.
- Participated in dilution refrigerator operations — including disassembly, sample mounting, reassembly, and cool-down procedures.

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 λ/4 and λ/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 **Link**

Jul 25 **Analyzed bulk and monolayer MoS_2 using Density Functional Theory (DFT)**

- Designed **2D MoS_2** 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 choice (POTCAR), and convergence testing.

Certification **Link**

Sep 25 **Introduction to Quantum Computing:** Quantum Algorithms and Qiskit – IIT Madras,2025
Aug 25 **Quantum Business Foundation** – IBM Quantum Learning (Online), 2025
Jun 24 **Semiconductor Technology & Microfabrication Workshop** – IISc Bangalore (Online), 2024

Honours & Awards

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**
2022 Recognized as top **1% students** in the **ISC board examinations**.