SANSKRITI CHITRANSH

chitransh.sanskriti@gmail.com • +91 7007651934

Education

Birla Institute of Technology and Science (BITS), Pilani
M.Sc. (Hons.) Physics 2015 - 2019
CGPA : 8.59/10

City Montessori School, Lucknow (Council for the Indian School Certificate Examination)
High School : 96.75% 2013 - 2015

Loreto Convent Intermediate College, Lucknow (Council for the Indian School Certificate Examination)
Secondary School : 94.00% 2007 - 2013

Research Experience

Research Assistant
Indian Institute of Science, India
Advisor : Prof. Vibhor Singh January 2020 - present
Ground State Cooling of Electromechanical Oscillator with a Transmon

- Reviewing opto-mechanical cooling theory to implement ground state cooling of a nano-mechanical resonator coupled to a flux-driven transmon
- Simulating cooling schemes with $\sigma_z - \sigma_x$ and $\sigma_x - \sigma_x$ resonator-qubit coupling to optimise qubit parameters for effective ground state cooling of the oscillator from bath thermal temperature ~ 150 phonons.

Research Assistant
Tata Institute of Fundamental Research, India
Advisor : Prof. R. Vijayaraghavan June 2019 - December 2019
Towards Implementing All-to-All Coupling in Superconducting Qubits

- Reviewed inter-qubit coupling in trapped ion systems and superconducting circuits to implement all-to-all qubit coupling in a small scale superconducting quantum processor.
- Longitudinally coupled the qubits and the cavity such that qubits remain decoupled and communicate only via the cavity (analogous to inter-ion coupling in trapped ion chains through the ion-chain motional modes)
- Simulated first and second order transitions to implement controlled-NOT gate and explored microwave cavity architecture and device fabrication

Master's Thesis
Centre for Quantum Technologies, Singapore
Advisor : Prof. Manas Mukherjee June 2018 - November 2018
A Novel Ion Source for Quantum Computing: A Prototype Development

- Built an ion source for Ion Trap Quantum Computing based on an original design to overcome defects like trap instability and anomalous heating faced by common ion sources (resistive ovens, laser ablation of targets)
- Conducted extensive survey of trap loading techniques, trap defects and devised alternate trap loading scheme
- Designed required components for the loading scheme and assembled ultra-high vacuum, optical and imaging systems to test the ion source

Selected Projects

Superconducting Circuits and Applications in Quantum Information Devices
Advisor : Prof. Jayendra N Bandyopadhyay, BITS Pilani January 2018 - May 2018

- Comprehensively studied superconducting devices from the basics of solid-state theory

- Covered essential elements of superconducting devices (Josephson Junctions, SQIDs, flux, phase and charge qubits, Transmons) and explored their use in hybrid quantum circuits, quantum gates and quantum state preparation

Experimental Techniques in Quantum Optics
Advisor : Prof. Jayendra N Bandyopadhyay, BITS Pilani August 2017 - December 2017

- Performed an in-depth study of contemporary experimental techniques in quantum optics
- Studied the fundamentals of quantum optics theory (classical and quantum models of light, optical instruments, lasers) and experimental applications of linear and non-linear optics (photo-detection, squeezing).

Relevant Courses

Quantum Mechanics, Quantum Optics, Quantum Information and Computing, Solid State Physics, Atomic and Molecular Physics, Mathematical Methods in Physics, Statistical Mechanics and Computational Physics

Technical Skills

Nanofabrication : Electron beam lithography, electron beam evaporation, plasma ashing
Optical Assembly : Optical alignment and application, pulsed laser set-up and operation, basics of ECDL development and laser locking techniques
Ultra-High Vacuum Pumping Systems : UHV protocols, UHV systems design
Softwares : AutoCAD, COMSOL, CPO, Inventor, Mathematica, Microwave Office, SIMION
Programming Languages : Java, Python (QTip, QCAT)

Schools attended

5th Simons Centre for Study of Living Machines-NCBS Monsoon School June 2017
National Centre for Biological Sciences, Bangalore, India
School on applications of physics and engineering in biology wherein topics of study included the structure and function of bio-molecules, the organization of cells, the development of organisms, populations and ecosystems and aspects of evolution

Extra-curricular Activities

Frontiers of Science
Outreach Program, Tata Institute of Fundamental Research November 2019

- Volunteer for the Science Popularisation and Public Outreach Committee of the Tata Institute of Fundamental Research for the promotion of science education and research among school children from rural and urban areas
- Demonstrated and explained evaporative cooling and electronic noise reduction at low temperatures in the context of quantum computing to school children from around the country

President, MATRIX, Literary Society, BITS Pilani August 2017 - May 2018

- Led a community of 30-35 literature and cinema enthusiasts
- Conducted directed discussions on philosophy, writing, art and current affairs, organised presentations and introductions of books, movies etc.

Substitute Teacher, St. Ann's Convent School, Lucknow July 2017

- Class teacher for class VIII, responsible for 30 underprivileged students. Conducted daily activities, maintained class records and organized students' participation in school events
- Taught chemistry to classes VI-X, covered topics like classification of elements, reactions, periodic table and electrolysis