Gaurav Agarwal

Integrated M.Sc. Physics,
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Education

- **Integrated Physics M.Sc.** 2018-2023
  Centre for Excellence in Basic Sciences (UM-DAE-CEBS) *Mumbai, India*
  CGPA : 8.81/10
- **High School - CBSE** 2015-2017
  Little Scholars *Kashipur, India*
  Scored 99.718%ile nationwide (1.1 million appeared.)

Projects

- **Superconducting Qubits - Master Thesis** Aug, 2022 - April, 2023
  under Prof R. Vijayaraghavan, TIFR *Mumbai, India*
  Currently ongoing, working on the following:
  - 7 qubit system using QM's OPX FPGA platform for DRDO, Govt of India.
  - 2 Qubit RB : Group table, sequence generation, and RB testing on the system above.
  - LabView to Python : Rewriting codes from scratch, including low-level instrument control.
  - Optimal Control : Implementation of DRAG.
  - Microwave component optimization : Implementation of Super-heterodyning.
  - Optimal Control : Reduction of pulse times using Deep-Reinforcement learning.
  - Amplification and drift : Studying drift in the bifurcation amplifier. * *If time permits.*
- **Superconducting Tunnel Junctions** Jan, 2022 - Apr, 2022
  under Prof. Sangita Bose, CEBS and Prof. Pratap Raychaudhari, TIFR *Mumbai, India*
  Learnt techniques associated with low temperature measurements in dry and wet cryo systems, with and without magnetic fields, including data analysis and simulation of NbN-oxide-Ag superconducting tunnel junctions.
- **Graphene - electronic properties and defects** Sep, 2021 - Dec, 2021
  under Prof. Vijay Singh, dHBCSE/UM-DAE-CBS *Mumbai, India*
  Studied the tight-binding model of Graphene with next-nearest neighbor hopping and effects of substitutional defects on the band structure with the Koster-Slater Model.
- **Brownian Motion (BM) and Fractional BM** Jun, 2021 - Aug, 2021
  under Prof. Tridib Sadhu, TIFR *Mumbai, India*
  Studied statistical properties of Brownian motion and fractional Brownian Motion.
  Developed its modeling with Langevin & Fokker-Planck equations.
  Verified properties with simulations.
- **Development of a data acquisition system** Jun, 2019 - Jul, 2019
  under Prof. R. Nagarjan, UM-DAE-CEBS *Mumbai, India*
  DIY-ed a data acquisition system using Arduino & Raspberry Pi for the UG lab.
  Learnt technicalities of fast data collection, live processing and storage.
  Demonstrated/taught experiment(s) to summer-school participants using the system.
- **A random walk in the UG lab** May, 2019 - Jul, 2019
  under Prof. M. Nyayate, UM-DAE-CEBS *Mumbai, India*
  Performed interesting experiments on
  - Diffraction and interference using Lloyd's mirror & Fresnel's Bi-prism.
  - Microwave diffraction, interference and standing waves.
  - Frequency response of Piezo-electric disks and films.
  - Working and use of in-house DIY made Lock-in Amplifiers.
- **Topology - Reading Project** Dec 2018 - Nov, 2019
  under Prof. M.S. Raghunathan, UM-DAE-CEBS/TIFR *Mumbai, India*
  Overviewed group theory and basics of topology.

Other Achievements

DISHA Scholarship by Dept. of Atomic Energy, Govt. of India 2018-23
All India Rank 76 in National Entrance Screening Test 2018
Attended **Vijyoshi National Science Camp** by Indian Institute of Sciences, Bangalore . . . 2018
Delivered a flyover-bridge proposal to the Mayor of Kashipur (**approved, construction started**) 2016

Skills

- **Languages** : Speaking, reading and writing proficiency in English and Hindi.
- **Programming** : Python (QUA, QuTiP, Qiskit, QCoDeS PyVISA, SciPy, Matplotlib, Numpy, Numba), Fortran 95, LaTeX, Tensorflow, PyTorch, Bash scripting.
- **Software** : GNU/Linux, AWR, LabVIEW, Mathematica, gnuplot, Origin, Google Colab, git, GIMP, Resolve.
- **Hardware** : Standard Microwave components, Dilution refrigerators, He cryostats, Oscilloscopes, Turbo Molecular Pumps, Sputter systems, Arduino, Raspberry Pi, QM's OPX.

Certifications

- **Machine Learning for Chemistry and Drug Design** 2022
  Certificate : Github Link *IIITH*
- **Neural Networks and Deep Learning** by Andrew Ng 2020
  Certificate : http://coursera.org/verify/VW66ZFSGKEAK *deeplearning.ai*
- **Improving DNN: Hyperparameters and Regularization** by Andrew Ng 2020
  Certificate : http://coursera.org/verify/WH6J33HKTSAG *deeplearning.ai*
- **Structuring Machine Learning** by Andrew Ng 2020
  Certificate : http://coursera.org/verify/4SEWMPSLFV96 *deeplearning.ai*
- **Convolutional Nets and Deep Learning** by Andrew Ng 2020
  Certificate : http://coursera.org/verify/456AC27RF993 *deeplearning.ai*
- **Machine Learning** by Andrew Ng 2020
  No certificate *Stanford, Coursera*

Experience/Positions of Responsibility

- **Teaching**: Designed, setup and demonstrated experiments in the UG Physics lab to summer school participants.
- **Organizer - Inter-college Sports Event**: Managed administrative paperwork, volunteers, marketing, and organized 50+ Badminton matches within restrictive player schedules.
- **Organizer - Movie Club**: Responsible for selection, marketing and screening movies & documentaries across different genre and languages every Friday night at the institute.

References:

- **Prof. R. Vijayaraghavan**
  Tata Institute of Fundamental Research, Mumbai *Master thesis guide*
- **Prof. Sangita Bose**
  UM-DAE-CBS, Mumbai *Semester project guide, 2 theory courses & a lab course*
- **Prof. Vijay A. Singh**
  Homi Bhabha Centre for Science Education, Mumbai *Semester project guide*
- **Prof. Tridib Sadhu**
  Tata Institute of Fundamental Research, Mumbai *Summer project guide*