Curriculum Vitae

Dhruva Sambrani

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Educational Qualifications

BS-MS | 2018-2023 | IISER Mohali

CPI: 9.01
SPI (Year 1): 9.8
SPI (Year 2): 9.1
SPI (Year 3): 8.5
SPI (Year 4): 8.9

12th Grade | 2018 | Primus

Physics: 99
Math: 94
Chemistry: 95

Relavant Elective Courses | 2018-2023 | IISER Mohali

- Quantum Computing and Quantum Information
- Random Processes
- Non Linear Dynamics
- Modelling Complex Systems
- Network Science
- Machine Learning and Data Science

Academic Endeavours and Conferences

QICF-22 | YITP-Kyoto Uni | 2022

Weeklong workshop with talks on Quantum Information, Computation and Communication. (Future)

QUANT22 | MPI-PKS Dresden | 2022

Four-day school for master students providing an introduction to the fast-moving field of quantum matter, focusing on many-body systems ranging from exotic states of matter to quantum computers

Qiskit Global Summer School | Qiskit | 2022

Participated and completed the QGSS-22.
QGSS Certificate. Credly Certificate

QICF-20 | YITP-Kyoto Uni | 2020

Weeklong workshop with talks on QInfo, QComputation and QCommunication.

Vijyoshi Camp | 2017

Attended the Vijyoshi camp in December 2017 against KVPY SA

KVPY | 600 | 1118 | 24

Qualified KVPY SA, SX, SB with a rank of 600, 1118 and 24 respectively and hold a KVPY Fellowship

Research and Work Experience - Discovering the World

Quantum Intern | BQP | Summer 2022

Interned at BosonQ Psi in the Quantum team where I proposed and built methods to solve problems of interest as part of a multiskilled team. Projects I was involved in were related to Feynman-Kac equation, Quantum Monte Carlo methods and Complexity analysis.

Superpositioned Grover's Algorithm | MN Bera | Summer 2022

In a similar vein to Quantum Resetting, this is an ongoing project to speed up the Grover's Search problem by applying a superposition of the Oracle and the Unitary.

Quantum Resetting of Quantum Systems | MN Bera | Summer 2021-22

An ongoing project building on multiple works on Stochastic Resetting of Classical Systems [arXiv:2107.11686] and on Quantum Systems [arXiv:2008.00510.pdf; Phys. Rev. B 98, 104309], and extending Anubhav Srivastava's Master's Thesis [2021, IISER Mohali], we apply a superposition of the evolve and the reset mechanisms and explore the resulting dynamics of the system. We see that for numerical examples, the convergence rate is faster and much closer to the reset location than in stochastic resetting. We want to extend this faster convergence to potentially speed up Quantum Walks [ISBN:978-3-319-97812-3], speeding up multiple algorithms which depend on Quantum Walks. Further, stochastic resetting can also model certain biological and economical processes which may be better explained by Quantum Resetting.

RLNN for Quantum Multiple Hypothesis Testing | Sarah Brandsen | Summer 2020

Optimized certain parts of the code for the algorithm suggested in the paper. Project stopped due to non-continuation of project from guide.

Ordering Channels | Sarah Brandsen | Winter 2020

An attempt to partial ordering of quantum channels by concepts of Data Driven Inferences. We define an order over the set of positive, trace preserving maps on the existence of another map which when applied would lead to equivalence. Based on Buschemi et. al. [New J. Phys. 21 113029] and Dall'Arno et. al. [Proc. R. Soc. A.47320160721].

Introduction to Quantum Mechanics and Computing | Arvind | Summer 2019

My First Year Summer Project was an introductory reading to the Mathematical Structures that underlie Quantum Mechanics and then take it forward to a theoretical introduction to Quantum Information and Quantum Computing. I also attempt to simulate a Quantum Computer on a Classical computer and making a Julia module for the same. This paper serves as a very brief introduction to Quantum Computing and documentation of the code in the form while publishing.

Relativistic Black Body Radiation | JS Bagla | Winter 2018

As part of my First Year Winter Project, I took up the project Black body radiation in special relativistic frames under JS Bagla, IISER Mohali, where I looked at how Black Body Radiation transforms in a frame that is moving uniformly with respect to the source. We see that the radiation is no more uniform, leading to a force on the particle. The quantitative analysis of this force is done using numerical methods in Julia.

Programming - Reinventing The World

IISER-M App | Android | Firebase

I started making the Unofficial IISER-M app for Android in the Summer of 2019. With 200+ downloads, it remains in constant development with new features being added every 6 Months

Modelling Complex Systems | Julia | 2021

As part of a course, I have learnt multiple models often used in the field and explored quite a bit in the following repository

QuantumComputing.jl | Julia | Package

An attempt to simulate a Quantum Computer and making a Julia module for the same. The associated paper also acts as the documentation

Minivet Birding App | Android | SQL

I contributed in making the Minivet Birding App under Dr. Manjari Jain's Behavior and Ecology Lab, IISER-M. Minivet is an app developed to assist both budding and experienced birders.

Coursera Courses | Python, Scala | Coursera

Completed the course Simulation and modeling of natural processes offered by Geneva University. Received Certificate with a grade of 95.31%

Completed the Specialization Introduction to Discrete Mathematics for Computer Science offered by National Research University Higher School of Economics & University of California San Diego. See Certification
Courses Completed:
- Mathematical Thinking in Computer Science
- Introduction to Graph Theory
- Combinatorics and Probability
- Delivery Problem
- Number Theory and Cryptography

Completed the course Functional Programming Principles in Scala offered by Geneva University. Received Certificate with a grade of 96.00%

Tetra: Turing Hunt Game Engine | Python | PySimpleGUI

A game engine for the annual Turing Virtual Treasure Hunt. Built in Python with PySimpleGUI.

PlutoReport.jl | Pluto | Package

A Julia package to make better reports and talks in Pluto Notebooks, especially with citation support, presentation mode with controls and timing, and planned integration with bibliography managers.

Github Profile | Multiple Languages | Others

Do visit my GitHub profile to see my other projects in a multitude of languages and fields! Link at the bottom of the page