Curriculum Vitae

Abhishek Mishra

BS-MS Student,
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India.

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Education

2017 - 2022	Indian Institute of Science Education and Research, Kolkata 5 year BS-MS Dual Degree , MS:~8.9/10
2015 - 2017	D.A.V Public School Chandrasekharpur, Bhubaneshwar Higher Secondary, Science(Physics,Chemistry,Maths): 95%

Research Interests

Quantum Information Theory, Quantum Optics,
Quantum Foundations, Quantum Cryptography

Skills

Advanced	Semi-Definite Programming, Numpy, Scipy, Python, C, Java, Origin
Intermediate	Julia, Mathematica, Machine Learning, App Development, Blockchain

QIP Projects

Aug 2021-May 2022

Master Thesis in Quantum Information.

Prof. Guruprasad Kar – ISI Kolkata

My thesis was on proving the security of the BB84 Protocol. The principal ideas in this proof are Entanglement Monogamy, connection between Quantum Error Correction and Entanglement Distillation and how Quantum Error Codes perform Privacy Amplification and Information Reconcillation. I have proved these results and illustrated the entire proof in the paper titled "Simple Proof of Security of the BB84 Quantum Key Distribution Protocol"

Aug – Dec 2021

Independent Study in Quantum Optics

Prof. Chiranjib Mitra – IISER Kolkata

After a background study on Quantum Optics, I studied about Quantum Langevin and Master equations for understanding open quantum systems. Also did a project on Universal Quantum Computation using Continuous Variables.

Dec 2021-Current

Project in Device-Independent Certification

Dr. Ramij Rahaman – ISI Kolkata

Using semi-definite programming, I studied device-independent relation between min-entropy and CHSH value. I am now working on robust self-testing of genuine multipartite entanglement. Constructed a general scalable library that exploits NPA hierarchy for any Bell scenario and any number of constraints.

Internships

Feb-July 2021 | **Internship In Quantum Information**
Prof. Guruprasad Kar – ISI Kolkata
A study project where I learned about mixed-state entanglement and quantum-communication, local distinguishability of pure orthogonal states, quantum random access codes and no masking theorem. It then concluded with a summer school on Quantum Foundations.

Summer 2019 | **Study of Mesoscopic Systems Using Stochastic Thermodynamics**
Dr. Prabhakar Bhimalapuram – IIIT Hyderabad
Learned about the Langevin equation and Markov chain and how to use them to model stochastic systems. Also learned various statistical tests like the KS test to compare the relevant computed plots to empirical data.

Summer 2018 | **Study of Nano-scale Properties of Gold colloid and Fractals**
Prof. Anushree Roy – IIT Kharagpur
Learned the usage and basics of Raman Spectroscopy and how to analyze microscope images using ImageJ to determine fractal parameters. Developed a program that fits the image to existing protein growth models and analyzed the gold colloid growth pattern in different media for bio-medical applications.

Relevant Courses

Physics | Quantum Information, Quantum Mechanics(I,II,III), Atomic &Optical Physics
Mathematics | Linear algebra, Group Theory, Analysis(I,II), Mathematical Physics

Teaching Assistant-ship

Spring 2022 | **Quantum Information Processing**
Motivation and introduction, Quantum Algorithms and computation

Conferences

June 2022 | **QIQT 2022**, IISER Kolkata
Attened and delivered a talk on my thesis work at the researcher's meet

Feb 2022 | **ICQIF 2022**, ISI Kolkata
Attened various talks on quantum foundations and cryptography.

Extra-curricular Activities

Web-Development | **Developed Websites or Apps for following:**
Inquivesta 2019, Annual fest of IISER Kolkata
CR snd Admin portal of Inquivesta 2020
IICM 2021 (Part of it)

Initiatives | **Started the Coding and Designing Club of IISER Kolkata**
Created the charter of the club. Formed the Council of the Office Bearers of the Club. Created the social media platform for the club.