Shivam Sawarn

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Github
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ACADEMIC QUALIFICATION

Quantum Interfaces Group, Universität Innsbruck
PhD, Physics, June 2028

Hindu College, University of Delhi
Master of Science, Physics, June 2023

Jamia Millia Islamia
Bachelor of Science, Physics, June 2021

RESEARCH EXPERIENCE

PhD thesis, *Universität Innsbruck*
PI: *Prof. Dr. Tracy E. Northup* June 2024 - Present

- Evaluating protocols for ion-photon entanglement to enhance the efficiency and fidelity of entanglement distribution in trapped-ion quantum networks.
- Conducting simulations of trapped ions interacting with cavity fields using QuTiP, with a focus on quantum information processing applications.
- Investigating aspects of distributed quantum information processing, emphasizing the integration of ion-photon entanglement techniques into quantum networks.

Research Intern, *Physical Research Laboratory, Department of Space, India*
Guide: *Prof. R.P. Singh*, Head, AMOPH Division May 2023 - March 2024

- Worked on 'Effect of turbulence on key-rate in BB84 protocol' experimentally under a team setting.
- Worked on three node quantum network simulation and hands-on experimental techniques in Quantum Optics Lab.
- Simulated Budget link equation for generation of key rate in BB84 and Quantum Networks.
- Analyzed the BB84 protocol within the SeQUeNCe simulator, conducting an in-depth study on throughput, error rates and latency.

Quantum Open systems and Master Equation Implementation through Reinforcement Learning, *IBM QAMP Fall'22 & Spring'23* Sep 2022 - Dec 2023
Guide:*Abhijit Mitra, Dr. Vaibhaw Kumar*(IBM)

- Worked out on proofreading of Unitary and non-Unitary part of Open Quantum Systems Dynamics and on different noise models including Markovian and non-Markovian noises.
- Responsible for applying different protection and recovery reward of the agent required for reinforcement learning of the non-unitary part of Schrodinger equation.
- Applied simple instances of open system on models like Quantum Boltzmann Machine(QBM) which showed perfect match between the probability generated and expected.
- Working on solving complex quantum open system through QITE models.

Quantum Global Summer School, *IBM* July 2022

- Attended 4 weeks summer school focused on Quantum simulations.
- Developed the skills and know-how to explore the world of quantum computing and its applications with a focus on quantum simulations using NISQ hardware.

- Gained significant knowledge and skill in quantum computation, using the physics, math, and python skills required to model a molecule using Qiskit.

Predicting the Electron Invariant Mass from the CERN Dielectron Collision Data, *Wolfram India School* Jan 2022

- Attended 3 weeks school and completed the project under a mentor.
- Explored various features of the di-electron collision using rigorous data analysis tools on a dataset consisting 100,000 dielectron events in the mass range 2-110 GeV.
- Used a custom neural network on test dataset for predicting the invariant mass of the electron.

PROFESSIONAL EXPERIENCE

Consultant, *Wolfram Research, Inc.* Feb 2022 - Nov 2023

- Work with Quantum Framework team which is responsible for creating framework that offers general suite of modelling capabilities for simulating quantum computation, with full integration into Mathematica and Wolfram Language.
- Create community post regularly on various topics of Quantum Information Theory such as Quantum counterpart of Classical gates, Distance measures for Quantum Information, Interactive Bloch sphere, Quantum State
- Responsible for algorithm development, proofreading and checking existing algorithm of the Framework.

Qiskit Advocate, *Qiskit* Aug 2022 - Present

- Recognized for my contributions to the Qiskit and the quantum community, and demonstrating an ability and commitment to educate and influence others by sharing ideas, knowledge and expertise in the field of quantum computing.
- Gathered a deep level of understanding with Qiskit including circuits, algorithms, simulators, qubits and noise.
- Responsible for mentoring various IBM Quantum Community Events like Quantum Challange, Quantum Explorer, Global Summer School

TEACHING EXPERIENCE

Mentor:,

- **Wolfram Summer School 2023**
  - Responsible to guide four students from Physics track and assisting them in creating an original project.
- **Wolfram Fundamental Science Winter School 2023**
  - Responsible to guide two students from Science track in creating original project.
  - Projects proposed were 'Target Probabilities with Quantum Circuits' and 'n-p type problems'.
- **IBM Qiskit**
  - Quantum Global Summer School 2023
  - IBM Quantum Challange Spring'23
  - IBM Quantum Challange Fall'22

Teaching Assistant:

- **Wolfram Summer School 2022**
  - Aided 20+ students in coding for projects proposed during the school.