Animesh Banik

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Profile

Researcher in Quantum Information Science with contributions to novel state discrimination methods and quantum teleportation protocols. Skilled in analytical problem-solving and quantum circuit simulation using Qiskit and PennyLane, with publications accepted and under review in international journals. Experienced in mentoring, teaching, and scientific outreach, committed to advancing quantum communication and computation..

Research Interests

- Quantum Communication
- Quantum Cryptography
- Quantum Simulation
- Quantum Error Correction
- Quantum Algorithm
- Optics and Photonics

Publications

- **Journal Publications:**

1. **Animesh Banik**, Md. Shihab Khan, Rafid Masrur Khan, Syed Emad Uddin Shubha, Mahdy Rahman Chowdhury, "Secure and Efficient n-Qubit Entangled State Teleportation Using Partially Entangled GHZ Channels and Optimal POVM." AVS Quantum Science, 2025 (Q1, IF: 3.0).
   `doi: 10.1116/5.0284072 Code`

- **Conference Posters:**

1. **Animesh Banik**, Md. Shihab Khan, Md. Tareq Aziz, Dr. Quazi Muhammad Rashed Nizam. "In search of a potential method for teaching quantum mechanics at undergraduate level". In 5th ICPSDT organized by Department of Physics, CUET.

Research & Teaching Experience

Research Assistant — University of Chittagong, Chattogram — June 2024 – Present

Supervisor: Professor Dr. Quazi Muhammad Rashed Nizam

- Designed and delivered lecture materials for graduate-level Quantum Mechanics courses, improving clarity and engagement for 90+ students.
- Assisted in course restructuring by integrating problem sets and simulations, enhancing student problem-solving practice.
- Co-supervised undergraduate researchers, guiding them toward independent project development and manuscript preparation.
- Conducting research in quantum communication and simulation, leading multiple manuscripts under review and preparation.

- **Ongoing Research Projects:**

1. "Generalized State Discrimination for Tunable Quantum Key Distribution" — Developing a hybrid POVM framework for improved balance between error and inconclusive outcomes and investigating the consequences in a modified B92 protocol (prepared for submission).
2. "Quantum Simulation of Nuclear Reactions" — Contributing variational simulation methods to explore low-energy nuclear reaction dynamics (in preparation).
3. "Variational Quantum Eigensolver (VQE) for Hydrogen Isomers" — Implementing VQE circuits to model spin states and bonding of hydrogen isomers (in preparation).

Education

University of Chittagong — June 2024 – Present
M.Sc. in Physics

University of Chittagong
B.Sc. in Physics — CGPA: 3.40/4.00

Relevant Courses: Quantum Mechanics I & II, Solid State Physics I & II, Computational Physics, Statistical Mechanics and Radiation, Computer Architecture and Programming.

Honors and Awards

- *IBM Quantum Excellence Badge (QGSS 2025)* — Awarded for completing all four core labs of the IBM Quantum Global Summer School 2025.
- *QBronze: Quantum Computing and Programming (using Qiskit)* — Diploma awarded for completing the QBronze Workshop organized by QWorld and QIndia.
- *International Astronomy and Astrophysics Olympiad 2023* — Qualified for the Pre-final Round, showcasing strong skills in physics, astronomy, and analytical reasoning.

Test Scores

- **IELTS Academic (2025)**: Overall 8.0/9.0 [Reading: 9.0; Listening: 8.5; Writing: 8.0; Speaking: 7.0]

Technical & Soft Skills

Programming Language : Python, C, C++ (Used for relevant data analysis).
Simulation Software : Qiskit, PennyLane, Cirq (Used for simulating quantum algorithms and protocols).
Formatting Application : LaTeX (Used for scientific writing).
Soft Skills : Scientific communication, Collaboration, Leadership, Self-directed learning, Public outreach & engagement, Integrity & intellectual independence.

Selected Certificates

- *Mahdy Research Academy Thesis Program (2024–2025)* – Completed both (*first* and *second*) parts of the private online thesis course/program in Quantum Computing & Information.
- *Womanium and WISER Quantum Program Challenges (2025)* – Completed PennyLane *Introduction to LCUs* and *A Simple Trotterization*.
- *Basic programming with Python* – issued by Bangladesh Computer Council (ICT Division, EDGE Project) for successfully completing the training program on "Basic programming with Python"

Leadership & Outreach

- **Team Leader, QRNLab Outreach Booth:** Led the QRNLab team in organizing and managing a public outreach booth at a national research festival, engaging hundreds of visitors with demonstrations on quantum physics and fostering scientific curiosity among students and the general public.