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 Interest

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

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 (Q1-indexed, IF: 3.00)(Published in AVS Quantum Science 2025).
   `doi: 10.1116/5.0284072 Code available on GitHub`

- **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**

- 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.
- Conduct ongoing 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 (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.
- *General Scholarship* — Awarded by Dhaka Board (H.S.C, 2018) and Chittagong Board (S.S.C, 2016).

Test Scores

- **IELTS Academic (2024)**: 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++.
Simulation Software	: Qiskit, PennyLane, Cirq.
Office Application	: Microsoft Office Suite, LaTeX.
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

- 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.
- Volunteered in humanitarian initiatives, including distributing winter clothes in remote villages, providing relief materials in flood-affected areas, contributing to community support and social responsibility.