

Animesh Banik

animesh4physics@gmail.com | linkedin.com/in/animesh-banik | animeshbanik144.github.io

Research Interests

- Quantum Algorithm
- Quantum Error Correction
- Quantum Simulation
- Quantum Information
- Quantum Communication
- Quantum Benchmarking

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 Github link

2. **Animesh Banik**, Md. Shihab Khan, Rafid Masrur Khan, Syed Emad Uddin Shubha, Quazi Muhammad Rashed Nizam, "Generalized State Discrimination for Tunable Quantum Key Distribution: The phiQKD Protocol". ArXiv Preprint

doi: 10.48550/arXiv.2511.06488 Github link

Conference Presentations

1. **Animesh Banik**, Md. Shihab Khan, Rafid Masrur Khan, Syed Emad Uddin Shubha, Quazi Muhammad Rashed Nizam, "Efficient Quantum Key Distribution using Generalized State Discrimination" 6th International Conference on Physics (ICP-2026), organized by Bangladesh Physical Society, University of Dhaka, Bangladesh.
2. **Animesh Banik**, Md. Shihab Khan, Rafid Masrur Khan, Syed Emad Uddin Shubha, Quazi Muhammad Rashed Nizam, "Generalized State Discrimination for Binary Non-orthogonal States." 6th International Conference on Physics for Sustainable Development and Technology (ICPSDT-2025), Chittagong University of Engineering & Technology (CUET), Bangladesh.
3. **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 - QRNLab

July 2023 - 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. "Quantum Simulation of Nuclear Reactions" - Contributing variational simulation methods to explore low-energy nuclear reaction dynamics (in preparation).
 2. "Simulating Holographic Scrambling and the Information Paradox" - Formulating optimal POVM-based decoding protocols to model entanglement dynamics and information recovery in black hole toy models.

Education

University of Chittagong	January 2025 – April 2026
M.S. in Physics	GPA: 3.48/4.00
University of Chittagong	January 2019 - December 2024
B.Sc. in Physics	CGPA: 3.40/4.00

Professional Skills

Programming Languages	: Python, C, C++.
Simulation Softwares	: Qiskit, PennyLane, Cirq.
Formatting Tool	: LaTeX.
Language	: English (IELTS: 8.0/9.0), Bengali (Native), French (Beginner).

Honors and Awards

- *Global Quantum Mechanics Challenge 2026* - Qualified for the Semi-finals, reflecting scientific problem-solving skills and interest in quantum mechanics beyond the school’s curriculum
- *National Science and Technology Fellowship (2025-2026)* - Awarded for academic merit and research potential.
- *Best Oral Presenter* - 6th International Conference on Physics for Sustainable Development and Technology (ICPSDT-2025), CUET, Bangladesh.
- *IBM Quantum Excellence Badge (QGSS 2025)* - Awarded for completing all four core labs of the IBM Quantum Global Summer School 2025.
- *QWorld Diplomas (QSilver, QBronze)* - Awarded for completing the QSilver-35 and QBronze-167 Workshops organized by QWorld and respective QCousins.
- *International Physics, Astronomy and Astrophysics Olympiads* - Qualified for the Semi-final Round (Physics 2025) and Pre-final Round (Astronomy 2023), showcasing strong skills in physics, astronomy, and analytical reasoning.

Selected Projects & Hackathons

- *MIT iQuHACK 2025 (IonQ Challenge)* - Developed and submitted a quantum computing project utilizing IonQ hardware.
- *2nd Place, Track C - Q-volution Hackathon (2026)* - Awarded to my team "PlanQtons" in the global quantum hackathon organized by Girls in Quantum.

Selected Certificates

- *QWorld QTraining for Bronze (Instructor)* - Successfully completed QTraining10-3 and served as an instructor in a mock QBronze workshop organized by QWorld (September 2025).
- *Mahdy Research Academy Thesis Program (2024–2025)* - Completed both (*first* and *second*) parts of the private online thesis course/program in Quantum Computing & Information.

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.
- **Qiskit Advocate:** Engaged in global community outreach, mentoring beginners, and contributing educational content to promote quantum computing literacy through IBM Quantum initiatives.
- **QBangladesh Member:** Author monthly science communication articles for the QBangladesh newsletter, promoting quantum literacy to the national physics community.