

# Animesh Banik

[animesh4physics@gmail.com](mailto:animesh4physics@gmail.com) | [linkedin.com/in/animesh-banik](https://linkedin.com/in/animesh-banik) | [animeshbanik144.github.io](https://animeshbanik144.github.io)

## Research Interests

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- 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 [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"  
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, "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.
2. **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 Present

June 2024 –

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. "Variational Quantum Eigensolver (VQE) for Hydrogen Isomers" - Implementing VQE circuits to model spin states and bonding of hydrogen isomers (in preparation).

## Education

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**University of Chittagong**  
M.Sc. in Physics

January 2025 – Present

**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.

## Professional Skills

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- Programming Languages** : Python, C, C++ (Applied in relevant data analysis ).
- Simulation Software** : Qiskit, PennyLane, Cirq (Used for simulating quantum algorithms).
- Formatting Application** : LaTeX (Used for scientific writing).
- Soft Skills** : Communication, Collaboration, Leadership, intellectual independence.

## Honors and Awards

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- *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.
- *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.

## Selected Certificates

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- *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.
- *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

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- **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.

## Test Scores

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