

# Anish Banerjee

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🌐 [Anish Banerjee](#)

🌐 <http://AB271202.github.io/>

🔗 [AB271202](#)



## Education

2021 – 2025	📖 <b>Indian Institute of Technology, Delhi</b> BTech in Computer Science and Engineering	CGPA: 9.52/10 (3.8/4.0)
2019 – 2021	📖 <b>Bal Bhavan International School, Dwarka, Delhi</b> Intermediate / +2	Percentage: 96.4%
2009 – 2019	📖 <b>Mount Carmel School, Dwarka, Delhi</b> Matriculation	Percentage: 96.2%

## Research Internships



2024	📖 <b>Institute of Quantum Computing (IQC)</b> UNIVERSITY OF WATERLOO	<b>Title:</b> Unclonable Cryptography <i>Guide: Prof. Ashwin Nayak</i>
	<ul style="list-style-type: none"><li>• Studied Brodabent and Lord's paper [BL20] on Unclonable Encryption, gaining an understanding of the theoretical framework behind quantum encryption schemes and the impossibility of cloning quantum ciphertexts.</li><li>• Reviewed Tomamichel et al.'s paper [TFKW13] on the Monogamy of Entanglement Games, focusing on how entanglement properties affect quantum communication protocols and their applications in cryptographic tasks.</li><li>• Explored alternative methods to prove the security of conjugate encryption scheme in [BL20], aiming to extend it for multi-party encryption.</li></ul>	
2023	📖 <b>Center for Quantum Technologies (CQT)</b> NATIONAL UNIVERSITY OF SINGAPORE	<b>Title:</b> Quantum Advantage <i>Guide: Prof. Rahul Jain</i>
	<ul style="list-style-type: none"><li>• Explored methods for demonstrating quantum advantage including [AGL+23] on noisy random circuit sampling, [BCM+21], [BKVV20] on cryptographic tests of quantumness, and [KLVY22] on compiling non-local games into a proof of quantumness protocol.</li><li>• Presented research insights, enhancing my communication skills and contributing to discussions. My training report, along with slides and notes, is available <a href="#">here</a>.</li></ul>	

## Expository Writings

2023-2024	📖 Prepared expository writings on various topics pertaining to quantum information which can be found here: <a href="https://ab271202.github.io/notes">https://ab271202.github.io/notes</a>
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## Projects

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- 2024-Present  **BTech Project: Quantum Random Oracles** *Guide: Prof. Venkata Koppula*
- Investigated the random oracle model in quantum settings, comparing its impact on classical proofs: analyzed proof techniques in the QROM, including History-free Reductions [BDF<sup>+</sup>11], One-Way to Hiding [Unr14], and Compressed Oracles [Zha19].
  - Proved the security of Nielsen's non-committing encryption construction [Nie02] in the quantum random oracle model.
  - Analyzed quantum public key encryption constructions [Col23], [BGH<sup>+</sup>23], and explored minimal assumptions for achieving quantum CCA security.
  - Attempted a construction of quantum CCA<sub>1</sub> secure scheme from pseudorandom states.
- 2023-Present  **BQP Verification** *Guide: Prof. Venkata Koppula and Prof. Rajendra Kumar*
- Explored interactive proofs for quantum computation through Prof. Thomas Vidick's course [FSMP]; find my notes [here](#).
  - Analyzed Mahadev's work on classical verification of quantum computations [Mah23], gaining in-depth understanding of the protocol and constructions; find my report [here](#).



## Workshops

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- 2024  **Undergraduate School on Experimental Quantum Information Processing [USEQIP]**  
INSTITUTE FOR QUANTUM COMPUTING, UNIVERSITY OF WATERLOO  
Selected as one of 30 undergraduates globally for the week-long program on theoretical and experimental quantum information processing.
-  **CryptoWorks21 [CWs21]**  
INSTITUTE FOR QUANTUM COMPUTING, UNIVERSITY OF WATERLOO  
Participated in a workshop focused on quantum-safe cryptography and information security.
- 2023  **Quantum Camp [QCamp]**  
CENTER FOR QUANTUM TECHNOLOGIES, NATIONAL UNIVERSITY OF SINGAPORE  
Participated in a week-long intensive program on quantum computing and quantum technologies, involving lectures, industry visits and hands-on lab sessions.

## Service

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- 2024  **Teaching Assistantship**  
[COL202] DISCRETE MATHEMATICS *Instructor: Prof. Venkata Koppula*  
One of 12 undergraduates selected to serve as a TA. Led tutorial sessions for a group of students throughout the semester, offering personalized assistance with conceptual challenges, and providing feedback on proof-writing techniques.
- 2023  **Academic Mentor**  
[PYL101] ELECTROMAGNETISM & QUANTUM MECHANICS *Instructor: Prof. Vikrant Saxena*  
Responsible for conducting personalized doubt and revision sessions for first-year students.

## Scholastic Achievements

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- 2024 **Undergraduate Research Award**  
Selected as one of 30 undergraduates worldwide for a summer school and research internship at the Institute for Quantum Computing, University of Waterloo.
- 2022 **IIT Delhi Semester Merit Award**  
Awarded for being among the top 7% of students in both semesters I and II.
- Endowment Scholarship**  
Awarded for being among the top 15 students in the 2021 entry batch at IIT Delhi.
- 2021 **Joint Entrance Exam (JEE) Main**  
Secured AIR 40 out of 1,000,000 candidates who appeared for the exam.
- Joint Entrance Exam (JEE) Advanced**  
Secured AIR 373 out of 200,000 candidates who appeared for the exam.
- KVPY Fellowship**  
Conferred by DST GoI, secured AIR 134 out of 100,000 candidates who appeared for the exam.
- IOQP (Physics), IOQC (Chemistry)**  
Secured a place in the top 1% in these olympiads among 200,000 candidates.
- 2019 **NTSE Scholarship**  
Awarded by NCERT for ranking in the top 0.1% of students among over 1 million applicants.

## Select Courses Undertaken

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| Computer Science    | <b>Lattices in Computer Science, Basic Information Theory, Complexity Theory, Cryptography and Computer Security</b> |
| Mathematics         | <b>Probability and Stochastic Processes, Algebra</b>   |
| Quantum Information | <b>Applied Quantum Mechanics, Quantum Algorithms, Quantum Cryptography, Quantum Complexity Theory</b>                |

## Extra-Curricular Activities and Volunteering

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- 2023-2024 **Events Executive: Physics and Astronomy Club**  
Involved in organizing several events related to physics and astronomy including Cosmicon fest, Physics Olympiad, Quantum Computing Workshop etc.
- 2022-2023 **Volunteering: National Service Scheme**  
Volunteered for the Vidya teaching project under NSS, IIT Delhi, providing educational support to students from economically disadvantaged backgrounds. Awarded a trophy for "Significant Contribution to NSS, IITD."