Akash Kumar Singh

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Qualifications

Defence Institute of Advanced Technology (DIAT), Pune **Aug 2023 – July 2025**
M.Tech in Quantum Computing, CGPA: 8.44/10

Indian Institute of Science Education and Research (IISER), Tirupati **May 2022 – Jun 2023**
MS in Physics, CGPA: 8.1/10

Indian Institute of Science Education and Research (IISER), Tirupati **Aug 2018 – Apr 2022**
BS in Physics, CGPA: 6.2/10

Maharana Pratap Education Centre, Kanpur **2017**
Higher Secondary, 81.6%

Maharana Pratap Education Centre, Kanpur **2015**
Secondary, CGPA: 9.8/10

Projects

An Efficient Quantum Algorithm for Laplace Transform, DIAT & QClair. Quantum Labs **Aug 2024 – Jun 2025**

- Developed a novel quantum algorithm for computing the Laplace transform using quantum eigenvalue transformation.
- Achieved superpolynomial speedup over classical numerical methods; integrated into the QForge library.
- Applications in pharmacokinetics/pharmacodynamics for drug discovery.
- Supervised by Prof. G. Raghavan, DIAT Pune, in collaboration with Qclairvoyance Quantum Labs, Hyderabad.

Encoder for CSS Codes using Measurement-Based Quantum Computing, IISER Bhopal **May 2022 – Jun 2023**

- Developed a general scheme to encode any CSS code on MBQC using ZX-Calculus.
- Demonstrated for repetition code, Steane code, and Shor code.
- Verified approach using stabilizer evolution method of Gottesman.
- Supervised by Dr. Ankur Raina, IISER Bhopal.

Quantum N-Queens Solver, IISER Tirupati **Feb 2021 – Apr 2021**

- Implemented a quantum N-Queen solver using Qiskit (4×4 case).
- Instructor: Dr. Sambuddha Sanyal.

Quantum Approach to Non-Linear Dynamics, IISER Tirupati **Mar 2021 – Apr 2021**

- Wrote a term paper on ways to simulate classical nonlinear dynamics on quantum computers (Logistic model).
- Instructor: Prof. G. Ambika.

Skills

Languages: Python, Fortran, Java, HTML
Libraries: Qiskit, Pennylane, Numpy, Scipy, Matplotlib, Tikzit
Tools: LaTeX, GitHub
Concepts: Quantum Algorithms, Quantum Error Correction, Machine Learning

Scholar Achievements

- Secured highest marks in India in Quantum Computing exam by C-DAC (Scientist 'B' position), 2025.
- Qualified GATE (2023 and 2024) Physics and awarded AICTE GATE Postgraduate Scholarship.
- Cleared IISER Aptitude Test (IAT) for admission to IISERs, 2018.

Publications

- Akash Kumar Singh, Ashish Kumar Patra, G. Raghavan, K. Srinivasan: *An Efficient Quantum Algorithm for Laplace Transform*, [In preparation for arXiv submission, 2025].
- Akash Kumar Singh*, Atharva Manoj Khairnar*, S. Mandal, A. Raina: *Encoder design for CSS codes using MBQC and ZX-Calculus*, [*Equal contribution, manuscript in preparation, available on request].

Workshops Attended

- International Workshop on *Engineering and Integration Challenges in Quantum Communication and Quantum Computing*, C-DAC Pune (Mar 2024).

Academic Courses

M.Tech (DIAT): Quantum Computing 1 & 2, Digital System Design using FPGA, Advanced Quantum Communication, Nonlinear Optics, Quantum Metrology & Sensing, Machine Learning.

BS-MS (IISER Tirupati): Quantum Mechanics 1 & 2, Quantum Information, Optics & Photonics, Linear Algebra, Statistical Mechanics, Electrodynamics, Probability & Statistics, Structures of Mathematics, Data Science 1 & 2, Operations Research, Discrete Mathematics.

Positions of Responsibility & Extracurriculars

- Project Engineer for Quantum Algorithms Research, Centre for Development of Advanced Computing, CINE **(Current Position)**
- WISER Program on Quantum Algorithms for Differential Equations (Jun 2025 - Aug 2025)
- PennyLane Challenges (Aug 2025) – LCU & Trotterization Challenges.
- Fundamental Lecture Series on Theoretical Computer Science, IMSC Chennai (Jan 2024).
- QWorld QIntern 2023 – Diploma + Second Best Project & Second Best Presentation Awards.
- IBM Qiskit Global Summer School 2021 – Quantum Machine Learning, Certificate of Excellence.
- IBM Qiskit Global Summer School 2020 – Certificate of Quantum Excellence.
- Led team to organize IBM Qiskit Fallfest 2023, DIAT Pune (Oct 2023).
- Founder of QUIISER: Quantum Computing & Information Club, IISER Tirupati (Jan 2021 - Jun 2023).
- Core member of Institute Innovation Council (IIC), IISER Tirupati (Aug 2020 - Jan 2022).
- MHRD IIC Online Sessions: Promote Innovation, IPR, Entrepreneurship, and Start-ups (Apr 2020 - May 2020).
- Certificate of Excellence: Innovation & Entrepreneurship in Post-COVID World, RMSOEE, IIT Kharagpur (Jun 2020 - Aug 2020).

Hobbies

- Badminton
- Table Tennis