




# AKASH KUMAR SINGH

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## Qualifications

<b>Defence Institute of Advanced Technology (DIAT), Pune</b> <i>M.Tech in Quantum Computing</i>	<b>Aug 2023 – July 2025</b>
<b>Indian Institute of Science Education and Research (IISER), Tirupati</b> <i>MS in Physics</i>	<b>May 2022 – Jun 2023</b>
<b>Indian Institute of Science Education and Research (IISER), Tirupati</b> <i>BS in Physics</i>	<b>Aug 2018 – Apr 2022</b>
<b>Maharana Pratap Education Centre, Kanpur</b> <i>Higher Secondary</i>	<b>2017</b>
<b>Maharana Pratap Education Centre, Kanpur</b> <i>Secondary</i>	<b>2015</b>

## Projects

<b>An Efficient Quantum Algorithm for Laplace Transform</b> , DIAT & QClair. Quantum Labs <ul style="list-style-type: none"><li>Developed a novel quantum algorithm for computing the Laplace transform using quantum eigenvalue transformation.</li><li>Achieved superpolynomial speedup over classical numerical methods; integrated into the QForge library.</li><li>Applications in pharmacokinetics/pharmacodynamics for drug discovery.</li><li>Supervised by Prof. G. Raghavan, DIAT Pune, in collaboration with Qclairvoyance Quantum Labs, Hyderabad.</li></ul>	<b>Aug 2024 – Jun 2025</b>
<b>Encoder for CSS Codes using Measurement-Based Quantum Computing</b> , IISER Bhopal <ul style="list-style-type: none"><li>Developed a general scheme to encode any CSS code on MBQC using ZX-Calculus.</li><li>Demonstrated for repetition code, Steane code, and Shor code.</li><li>Verified approach using stabilizer evolution method of Gottesman.</li><li>Supervised by Dr. Ankur Raina, IISER Bhopal.</li></ul>	<b>May 2022 – Jun 2023</b>
<b>Quantum N-Queens Solver</b> , IISER Tirupati <ul style="list-style-type: none"><li>Implemented a quantum N-Queen solver using Qiskit (<math>4 \times 4</math> case).</li><li>Instructor: Dr. Sambuddha Sanyal.</li></ul>	<b>Feb 2021 – Apr 2021</b>
<b>Quantum Approach to Non-Linear Dynamics</b> , IISER Tirupati <ul style="list-style-type: none"><li>Wrote a term paper on ways to simulate classical nonlinear dynamics on quantum computers (Logistic model).</li><li>Instructor: Prof. G. Ambika.</li></ul>	<b>Mar 2021 – Apr 2021</b>

## 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

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

## Academic Courses

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**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

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- 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

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- Badminton
- Table Tennis