Kushagra Garg

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EDUCATION

IIIT - Hyderabad   Hyderabad, India

M.S. in Computational Natural Science   *July 2023 – Dec 2025*
    GPA: 9.5/10.0, Advised by Shantanav Chakraborty and Subhadip Mitra

B.Tech in Computer Science   *July 2019 – July 2023*
    GPA: 8.81/10.0

EXPERIENCE

Fujitsu Research   Bangalore, India

Researcher at Quantum lab   *July 2024 – Present*

- Leading development of a Lindbladian simulation algorithm for early fault-tolerant quantum computers, using interpolated collision models and polynomial interpolation to achieve exponential circuit-depth reduction.
- Built and validated the method end-to-end—from circuit design and error analysis to TFIM benchmarking—achieving $10{,}000\times$ higher precision at similar depth.
- Co-developing a quantum resource estimation package that outputs gate counts, depth, and hardware-specific metrics, enabling comparisons across algorithms, error-correction schemes, and device architectures.

Microsoft Research   Bangalore, India

Research Internship   *February 2024 – July 2024*

- Researched secure inference for large language models, focusing on multi-party computation protocols (Oblivious Transfer–based).
- Exploited symmetry properties of key operators (ReLU, GeLU, LayerNorm) to reduce both computation and communication overhead. Achieved $2\times$ cost reduction over prior secure inference techniques, improving scalability of privacy-preserving LLM deployment.

QunaSys Inc.   Tokyo, Japan

Research Internship   *June 2022 – January 2024*

- Developed qubit-efficient entanglement estimation methods using DMERA, enabling simulations of larger quantum states on limited hardware.
- Showed through ZX-calculus analysis that these tensor-network ansätze avoid barren plateaus, making them more reliable for variational algorithms.
- Implemented hardware-tailored diagonalization circuits in the Quri Parts package, reducing circuit depth and measurement costs for VQE experiments.

IIIT - Hyderabad   Hyderabad, India

Teaching Assistant   *August 2022 – April 2023*

- Teaching Assistant for Automata Theory
- Teaching Assistant for Statistical Methods

PUBLICATIONS

1. **K. Garg**, Z. Ahmed, S. Mitra, S. Chakraborty. "Simulating quantum collision models with Hamiltonian simulations using early fault-tolerant quantum computers." *Physical Review A*, vol. 112, no. 2, Aug. 2025.

2. **K. Garg**, Z. Ahmed, A. Thomasen. "Entanglement determination with a deep multiscale entanglement renormalization ansatz." *Physical Review A*, vol. 111, no. 4, Apr. 2025.

3. Z. Ahmed, A. Chaudhuri, K. S. S. Grover, A. Rao, **K. Garg**, P. Malhotra. "Classifying CELESTE as NP Complete." *arXiv preprint arXiv:2012.07678*, 2020.

AWARDS & HONOURS

1. Deans List Academic Award 2023
2. Deans List Academic Award 2022
3. Winner Quantum Challenge Qhack 2022
4. KVPY Scholarship 2021