

# Ziqing Guo

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## Profile

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Hi:) I am currently a PhD from Texas Tech University and research affiliate at Lawrence Berkeley Lab trained as a Quantum/HPC researcher specialized with 256-node Perlmutter simulations and IBM/IonQ QPUs; developed arithmetic quantum algorithms and variational quantum algorithms particularly in block encoding, AI, and NP-hard optimization; my strengths lies in experimental/math rigor, coding, analysis, communication, cross disciplinary collaboration; mentors: Jan Balewski (CA), Alex Khan (MD, DC), Ziwen Pan (TX, AZ). **Keywords for my research:** quantum information (encoding), computing (QAOA), error correction (CSS), cryptography (communication upper bound).

## Education

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| Texas Tech University, PhD, High Performance Computing Center Fellow                                 | July 2026 (expected) |
| Newcastle University, MSc, Advanced Computer Science, Merit  | Aug 2023             |
| University of Tennessee, Chengdu University of Information Technology, BE,<br>Distinguished Graduate | Jul 2021             |

## Peer-reviewed Publications

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- Ziqing Guo, Ziwen Pan. (2026). Quantum Polynomial Root Finding and Entanglement-enhanced Spacial Encoding for High-dimensional Data Processing (APS March Meeting). Accepted.
- Ziqing Guo, Jan Balewski, Wenshuo Hu, Alex Khan, Ziwen Pan. (2025). Quantum Approximate Walk Algorithm (Nature npj unconventional computing Submitted, APS March Meeting Accepted).
- Ziqing Guo, Jan Balewski, Ziwen Pan. (2025). ShardQ: Circuit Cutting and 3D Tensor Recomposition for Quantum Simulation on Superconducting Qubits. Submitted to the International Symposium on Computer Architecture (ISCA). Submitted.
- Ziqing Guo, Jan Balewski, Ziwen Pan. (2025). Vectorized similarity attention with learnable encoding for quantum transformer. Accepted to the Association for the advancement of Artificial Intelligence quantum symposium (AAAI). Oral presentation.
- Ziqing Guo, Alex Khan, Victor S. Sheng, Shabnam Jabeen, Ziwen Pan. (2025). Quantum parallel information exchange (QPIE) hybrid network with transfer learning. In IOP Quantum Science and Technology. [HTML](#)
- Ziqing Guo, Steven Rayan, Wenshuo Hu, Ziwen Pan. (2025). [QAOA paper] Direct entanglement ansatz learning (DEAL) with ZNE on error-prone superconducting qubits. Accepted in IEEE International Conference on Quantum Computing and Engineering (QCE) Public Talk. [PDF](#) Oral presentation.
- Ziqing Guo, Jan Balewski, Ziwen Pan. (2025). Q-GEAR: Improving quantum simulation framework. In 54th International Conference on Parallel Processing (ICPP). Oral presentation. Accepted. [Best Poster Award PDF](#)

## Employment Experience

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| Research Affiliate Intern, Lawrence Berkeley National Lab, NERSC | Jun 2024 – Present  |
| Research Fellow, Texas Tech University                           | Sep 2023 – Present  |
| Research Assistant, Newcastle University                         | Jun 2022 – Jun 2023 |
| Cloud Engineering Intern, CISCO                                  | Dec 2021 – Jun 2022 |

## Grant & Awards

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- AAAI Quantum Symposia Travel Grant \$850 Nov 2025
- Texas Quantum Summit Travel Grant \$1k Oct 2025
- ICPP Travel Grant \$1k Sep 2025

- QCE Whiteacre College of Engineering Research Grant \$750 Sep 2025
- IonQ Research Grant, \$350k Jul 2025
- IBM LBNL QCAN Award, Contract, NERSC, DoE(No. DE-AC02-05CH11231) Mar 2025
- GenQ Quantum Hackathon, \$2.5k, Cat Qubit, First Prize Oct 2024
- Qiskit Quantum Summer School / Quantum Challenge, Full Achievement Jun 2024
- AWS Braket Quantum Application Development, Certificate Mar 2024
- AWS Braket Research Grant, \$2k, SV1, TN1 Feb 2024
- PennyLane Open Hackathon QHack / Code Camp, Top Completionist Jan 2024

## Invited Talks

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Special topic on Q-Gear generalization NVIDIA, 2025  
 International Conference on Parallel Processing, Quantum Computing, Sep 2025  
 International Conference on Quantum Computing, QAI, Aug 2025  
 Monterey Data Conference, Aug 2025  
 IBM Quantum / AI, TTU, Apr 2025  
 Improving quantum computation model, WCOE, Apr 2025  
 HackTX, University of Austin, Jan 2025 (Mentor)  
 Wave Technology, City of Calgary, Nov 2024  
 Platform Calgary, University of Saskatchewan, QAI Venture, Oct 2024  
 Berkeley National Lab, National Energy Research Computing, Quantum Group, Jul 2024  
 QuEra - NERSC quantum group neutral atom pattern formulation, Jun 2024  
 NVIDIA CUDA Quantum, QCAN, Jun 2024

## Professional Services

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npj Quantum Information  
 IOP Quantum Science and Technology  
 IEEE International Conference on Quantum Computing and Engineering  
 IEEE Transaction on Quantum Engineering  
 ACM Proceedings of the International Conference on Parallel Processing  
 Quantum and Beyond NEWSLETTER  
 Nature Machine Intelligence  
 ACM Transactions on Quantum Computing  
 Advanced Quantum Technology  
 Wolfram Research Student Ambassador  
 IEEE, ACM, APS member

## Projects

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| <b>Improve quantum circuit simulation tool</b>   | <a href="https://github.com/gzquse/Q-Gear">github.com/gzquse/Q-Gear</a> |
| • Support SLURM submission; PODMAN container; CUDA-kernel acceleration; PennyLane; image encoding. |   |
| <b>Direct entanglement ansatz learning for quadratic unconstraint binary optimization (QUBO)</b>   | <a href="https://github.com/gzquse/QUBO">github.com/gzquse/QUBO</a>     |
| • Distributed learning; efficient ansatz encoding; multiple QUBO problem solvers.                  |   |

## Skills

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**Quantum (Proficiency):** QISKIT (Heron-3 type superconducting), CUDA-Q (cuTensorNet, cuStatevector, NVIDIA-GPU), IonQ (Trapped Ion Aria-2, Forte), PENNYLANE (software stack), AMAZON BRAKET (QaaS), QCI-DIRAC3 (Photonic QPU), FIRE OPAL (Q-CTRL), TENSORCIRCUIT (Tencent), CIRQ (Azure, Microsoft)

**Engineering:** Python, Mathematica, Fortran, CUDA/MPI, Bash, Julia, Matlab, Cray HPC, Slurm, Container, DevOps, Scrapy/Data Mining

**Interests:** Guitar fingerpicker, Table tennis (competitive, shakehand grip), Calisthenics, Rollerblading, Culinary enthusiast

**Languages:** English (proficient), Mandarin (native), Japanese (Elementary)