Ziqing Guo

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Profile

Hi:) I was trained as a Quantum/HPC researcher specialized with 256-node Perlmutter simulations and IBM/IonQ QPUs; developed arithmetic quantum algorithms and variational quantum algorithms bridging classical–quantum data transport, AI, and NP-hard optimization; strengths: experimental/math rigor, coding, data analysis, communication, cross-disciplinary collaboration; collaborators/mentors: Jan Balewski (Berkeley), 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

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, Distinguished Graduate** — Jul 2021

Peer-reviewed Publications

- Ziqing Guo, Ziwen Pan. (2026). Quantum Polynomial Root Finding and Entanglement-enhanced Spacial Encoding for High-dimensional Data Processing (APS March Meeting). Submitted.
- Ziqing Guo, Jan Balewski, Wenshuo Hu, Alex Khan, Ziwen Pan. (2025). Quantum Approximate Walk Algorithm (Nature Communication, APS March Meeting). Submitted.
- 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

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

- **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

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

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

Improve quantum circuit simulation tool github.com/gzquse/Q-Gear

- Support SLURM submission; PODMAN container; CUDA-kernel acceleration; PennyLane; image encoding.

Direct entanglement ansatz learning for quadratic unconstraint binary optimization (QUBO) github.com/gzquse/QUBO

- Distributed learning; efficient ansatz encoding; multiple QUBO problem solvers.

Skills

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** (Tecent), **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)