

# KEVIN YIPU WU

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## EDUCATION

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### University of Washington

2024 - Present

Ph.D. Electrical & Computer Engineering

### William & Mary

2020 - 2024

B.S. Computer Science and Mathematics Double Major

## PUBLICATIONS

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- [1] Chi-Kwong Li, Kevin Yipu Wu, and Zherui Zhang. *Minimum-Spanning-Tree Tomography of Sparse Quantum States With and Without Entanglement*. Under review. 2025. arXiv: [2407.20298 \[quant-ph\]](https://arxiv.org/abs/2407.20298). URL: <https://arxiv.org/abs/2407.20298>.

## RESEARCH EXPERIENCE

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### Generation of 3D Reconfigurable Holograms for Optical Control

2024-2025

Advisor: Dr. Maxwell Parsons

University of Washington

- Designed and generated multi-depth 3D holographic phase patterns for experimental optical systems.
- Studied tradeoffs between hologram dimensionality, control fidelity, and computational complexity.
- Experimentally evaluated 3D holograms in laboratory optical setups.

### Phase Retrieval via Wirtinger-Flow for 3D Holographic Field Generation

2024-2025

Advisor: Dr. Maxwell Parsons

University of Washington

- Investigated Wirtinger Flow-based optimization methods for phase retrieval in holographic field generation, designing new loss functions resulting in better performance than the current SoTA.
- Studied convergence behavior and robustness of nonconvex optimization methods for multi-plane 3D holography.
- Evaluated suitability of Wirtinger Flow methods for experimental holographic control using a phase-only spatial light modulator.

### Investigation of 3D Geometries for qLDPC Code Implementation

2024-2025

Advisor: Dr. Maxwell Parsons

University of Washington

- Found that 3D layouts in neutral atom quantum computers have the potential to accelerate stabilizer measurement rounds for qLDPC codes by a significant factor, under certain assumptions.
- Studied connectivity, routing, and locality constraints in 3D versus 2D hardware geometries.
- Analyzed implications for scalable fault-tolerant quantum architectures.

### Construction and Characterization of a 2D Magneto-Optical Trap

2025

Advisor: Dr. Maxwell Parsons

University of Washington

- Contributed to the assembly, alignment, and characterization of a 2D magneto-optical trap (MOT).
- Assisted with optical alignment, magnetic field configuration, and system debugging.
- Supported characterization of atomic beam flux and trap stability for downstream experimental use.

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**Improving the Scalability of Neural Network Surface Code Decoders**

2023 - 2024

*Advisor: Dr. Qun Li**William & Mary*

- Designed transformer and structured selective state space models to decode the rotated planar code, a type of quantum error correction code.
- Implemented and trained the models using PyTorch to decode low distance rotated planar codes.
- Scaled decoders to higher distance codes using state compression techniques.

**Applying Differential Learning to Quantum Federated Learning**

2023

*Advisor: Dr. Qun Li**William & Mary*

- Trained a federated QCNN using the Qiskit Machine Learning library, achieving 89% simulator test accuracy and 70% IBM QPU test accuracy on the MNIST dataset.
- Implemented differential privacy to obfuscate sensitive client data, and performed a hyperparameter search to find an appropriate level of privacy.

**First AI/ML Challenge at Dahlgren**

2022 - 2023

*Advisor: Dr. Qun Li**NSWCDD*

- Contributed to a white paper detailing relevant literature and proposed approaches on the weapon target assignment problem, which resulted in the team's acceptance to the competition.
- Played a leading role in brainstorming and implementing approaches for automatic scheduling and coordination of advanced weapon systems.
- Architected, implemented, and trained several approaches to reduce damage to high value assets, including a Deep Q-Learning agent and heuristic-driven Greedy agent.
- The W&M team won 3rd place and \$20,000 in prize money.

**Quantum Operator Approximation via Nonconvex PSD Programming**

2022

*Advisor: Dr. Chi-Kwong Li**William & Mary*

- Approximated arbitrary quantum operators using the Pauli product rotations, exponentiated elements of the Pauli group.
- Transformed problem into nonconvex positive semidefinite programming problem, and optimized using a trust-region approach.

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**PRESENTATIONS**

- Chi-Kwong Li, Kevin Y. Wu, and Zherui Zhang. 2024. Efficient Circuit-Based Quantum State Tomography via Sparse Entry Optimization. Talk: MAO, Reno, Nevada.
- Chi-Kwong Li, Kevin Y. Wu, and Zherui Zhang. 2024. Efficient Circuit-Based Quantum State Tomography via Sparse Entry Optimization. Poster: JMM, San Francisco, CA.

## HONORS

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- **AQET Fellowship (Merit-Based)**, *University of Washington AQET Program*, 2025
- **AQET Scholar**, *University of Washington AQET Program*, 2024
- **Stephen K. Park Undergraduate Scholarship Award**, \$1500, *W&M Computer Science Department*, 2024
- **Phi Beta Kappa**, *Phi Beta Kappa Alpha Chapter of Virginia*, 2023
- **Elias Paparis Scholarship**, \$2500, *W&M Computer Science Department*, 2023
- **Robert C. and Muriel M. Jennings Scholarship**, \$3500, *Phi Beta Kappa Alpha Chapter of Virginia*, 2023

## PROFESSIONAL EXPERIENCE

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**Solutions Architect Intern** 2022 - 2023  
*Seattle, WA* *Amazon Web Services*

- Implemented an end-to-end quantum error mitigation pipeline, reproducing a state-of-the-art result and developing a Python-based transpilation protocol.
- Studied cloud quantum computing, error mitigation, and retrieval-augmented generation systems.
- Earned AWS Cloud Practitioner and Associate Solutions Architect certifications.

**Junior Software Developer** 2021 - 2022  
*McLean, VA* *ESPX Global Inc.*

- Built a data lake capturing electric grid market conditions and operational features.
- Developed and analyzed data pipelines using Python, AWS services, and SQL in a remote agile team.

**Student Intern Team Lead** 2022 - 2023  
*Alexandria, VA* *Asian Americans in Energy, Environment, and Commerce*

- Led and mentored a team of student interns delivering production website updates.

## SERVICE

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**Teaching Assistant** September 2024 - Present

**Research/Teaching Assistant** June 2024 - Present  
*Advisor: Dr. Chi-Kwong Li* *William & Mary Math Department*

**Intern Mentor** December 2023 - Present  
*-* *Asian Americans in Energy, Environment, and Commerce (AE2C)*

**Undergraduate Consultant** August 2022 - May 2024  
*Computer Science Consulting* *William & Mary*