Zhen Qin

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RESEARCH INTERESTS

- Structured optimization and theoretical foundations for tensor learning, signal processing, communication, quantum tomography and machine learning,
- Data processing leveraging special structures in high-dimensional space including sparse, low-rank, tensor-network-based and manifold-based models.

EDUCATION

Ohio State University (OSU)   **Columbus, America**
Ph.D. in *Computer Science and Engineering*   *Aug.2022- Now*

- **Advisor: Prof.** *Zhihui Zhu*

University of Denver (DU)   **Denver, America**
Ph.D. in *Electrical and Computer Engineering*   *Sep.2021-Jul.2022*

- **Advisor: Prof.** *Zhihui Zhu*

Southeast University (SEU)   **Nanjing, China**
M.Eng. in *Information and Communication Engineering (Signal Processing)*   *Sep.2017-Jun.2020*

- **Advisor: Prof.** *Jun Tao*

Ludong University (LDU)   **Yantai, China**
B.Sc. in *Information and Computation Science* (*Computational Mathematics*)   *Sep.2013-Jun.2017*

PUBLICATIONS

Quantum Information and Tomography

- **Z. Qin**, J. Lukens, B. Kirby and Z. Zhu, "Enhancing Quantum State Reconstruction with Structured Classical Shadows", *arXiv preprint arXiv:2501.03144*, 2025. (**Under first review at *npj Quantum Information***)
- **Z. Qin**, C. Jameson, Z. Gong, M. B. Wakin and Z. Zhu, "Optimal Allocation of Pauli Measurements for Low-rank Quantum State Tomography", *arXiv preprint arXiv:2411.04452*, 2024. (**Under first review at *IEEE Transactions on Signal Processing***)
- **Z. Qin**, C. Jameson, A. Goldar, Z. Gong, M. B. Wakin and Z. Zhu, "Sample-Optimal Quantum State Tomography for Structured Quantum States in One Dimension", *arXiv preprint arXiv.2410.02583,* 2024. (**Under second review at *IEEE Transactions on Information Theory***)
- C. Jameson, **Z. Qin**, A. Goldar, M. B. Wakin, Z. Zhu, and Z. Gong, "Optimal quantum state tomography with local informationally complete measurements", *arXiv preprint arXiv:2408.07115*, 2024.
- **Z. Qin**, C. Jameson, Z. Gong, M. B. Wakin and Z. Zhu, "Quantum State Tomography for Matrix Product Density Operators", *IEEE Transactions on Information Theory (**TIT**)*, 2024.
- A. Lidiak, C. Jameson, **Z. Qin**, G. Tang, M. B. Wakin, Z. Zhu and Z. Gong, "Quantum state tomography with tensor train cross approximation", *arXiv preprint arXiv:2207.06397,* 2022.

Optimization for Tensor Learning and Machine Learning

- L. Ding, **Z. Qin**, L. Jiang, J. Zhou and Z. Zhu, "A Validation Approach to Over-parameterized Matrix and Image Recovery", *Conference on Parsimony and Learning (CPAL)*, 2025.
- **Z. Qin**, M. B. Wakin and Z. Zhu, "Guaranteed Nonconvex Factorization Approach for Tensor Train Recovery", *Journal of Machine Learning Research (**JMLR**), 2024.*
- **Z. Qin** and Z. Zhu, "Optimal Error Analysis of Channel Estimation for IRS-assisted MIMO Systems", *arXiv preprint arXiv:2412.16827,* 2024. (**Under first review at *IEEE Transactions on Signal Processing***)
- **Z. Qin** and Z. Zhu, "Robust Low-rank Tensor Train Recovery", *arXiv preprint arXiv:2410.15224,* 2024. (**Under second review at *IEEE Transactions on Signal Processing***)
- **Z. Qin** and Z. Zhu, "Computational and Statistical Guarantees for Tensor-on-Tensor Regression with Tensor Train Decomposition", *arXiv preprint arXiv: 2406.06002,* 2024. (**Under first review at *IEEE Transactions on Pattern Analysis and Machine Intelligence***)
- **Z. Qin**, X. Tan and Z. Zhu, "Convergence Analysis for Learning Orthonormal Deep Linear Neural Networks", *Signal Processing Letters (**SPL**), 2024.*
- **Z. Qin**, A. Lidiak, Z. Gong, G. Tang, M. B. Wakin, and Z. Zhu, "Error Analysis of Tensor Train Cross Approximation", *Neural Information Processing Systems (**NeurIPS**)*, 2022.
- H. Yu, **Z. Qin**, and Z. Zhu, "Learning approach for fast approximate matrix factorizations", *IEEE International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**),* 2022.

Adaptive Signal Processing

- Y. Wang, **Z. Qin**, J. Tao, and Y. Xia, "Variable step-size convex regularized PRLS algorithms", *Signal Processing (**SP**),* 2024.
- Y. Wang, **Z. Qin**, J. Tao and M. Jiang, "A Variable Step-Size l0-PRLS Algorithm and its Application in Sparse Channel Estimations", *IEEE 97th Vehicular Technology Conference (**VTC**)*, 2023.
- **Z. Qin**, J. Tao, L. Yang and M. Jiang, "Proportionate recursive maximum correntropy criterion adaptive filtering algorithms and their performance analysis", *Digital Signal Processing (**DSP**),* 2023.
- Y. Wang, **Z. Qin**, J. Tao and L. Yang, "Performance Analysis of PRLS-based Time-Varying Sparse System Identifications", *IEEE 12th Sensor Array and Multichannel Signal Processing Workshop (**SAM**)*, 2022.
- **Z. Qin**, J. Tao, Y. Xia, and L. Yang, "A proportionate RLS using l_1 norm regularization, performance analysis and its fast implementation", *Digital Signal Processing (**DSP**),* 2022.
- **Z. Qin**, J. Tao, and Y. Xia, "A proportionate recursive least squares algorithm and its performance analysis", *IEEE Transactions on Circuits and Systems II: Express Briefs (**TCASII**)*, 2020.
- **Z. Qin,** J. Tao, L. An, S. Yao, and X. Han, "Fast sparse RLS algorithms", *IEEE 10th International Conference on Wireless Communications and Signal Processing (**WCSP**)*, 2018.

Underwater Acoustic Communications

- **Z. Qin**, "Dynamic Compressive Sensing based on RLS for Underwater Acoustic Communications", arXiv preprint arXiv:2304.11838, 2023.

- Y. Zhuang, J. Tao, **Z. Qin**, and M. Jiang, "Enhanced MSER Adaptive Equalization for Single-Carrier MIMO Underwater Acoustic Communications", *MTS/IEEE OCEANS Conference (OCEANS)*, 2022.
- **Z. Qin**, J. Tao, F. Qu and Y. Qiao, "Adaptive equalization based on dynamic compressive sensing for single-carrier multiple-input multiple-output underwater acoustic communications", *The Journal of the Acoustical Society of America (JASA), 2022*.
- Y. Wang, **Z. Qin**, J. Tao, F. Tong and Y. Qiao, "Sparse Adaptive Channel Estimation based on l0-PRLS Algorithm for Underwater Acoustic Communications", *MTS/IEEE OCEANS Conference (OCEANS)*, 2022.
- **Z. Qin**, J. Tao, and X. Han, "Sparse direct adaptive equalization based on proportionate recursive least squares algorithm for multiple-input multiple-output underwater acoustic communications", *The Journal of the Acoustical Society of America (JASA)*, 2020.
- **Z. Qin**, J. Tao, and X. Han, "Dynamic compressive sensing based adaptive equalization for underwater acoustic communications", *MTS/IEEE Global OCEANS Conference (OCEANS)*, 2020.
- **Z. Qin**, J. Tao, F. Tong, H. Zhang, and F. Qu, "A fast proportionate RLS adaptive equalization for underwater acoustic communications", *MTS/IEEE OCEANS Conference (OCEANS)*, 2019.
- **Z. Qin**, J. Tao, X. Wang, X. Luo, and X. Han, "Direct adaptive equalization based on fast sparse recursive least squares algorithms for multiple-input multiple-output underwater acoustic communications", *The Journal of the Acoustical Society of America (JASA)*, 2019.

HONOR & AWARDS

- **CSE Graduate Research Award,** Ohio State University   *Apr. 2025*
- **Excellent Academic Master's Thesis (1%),** Southeast University   *May. 2021*
- **Outstanding Graduate Award (10%),** Southeast University   *Jun. 2020*

PROFESSIONAL ACTIVITIES

- **Reviewer for the Following Journals**

IEEE Transactions on Information Theory
IEEE Transactions on Signal Processing
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Journal of Selected Topics in Signal Processing
Transactions on Machine Learning Research

- **Reviewer for the Following Conferences**

IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2023-2025)
IEEE International Workshop on Machine Learning for Signal Processing (MLSP 2024)
Neural Information Processing Systems (NeurIPS 2023)
Conference on Parsimony and Learning (CPAL 2024,2025)
International Conference on Learning Representations (ICLR 2024,2025)
International Conference on Machine Learning (ICML 2024,2025)
Annual AAAI Conference on Artificial Intelligence (AAAI 2025)