Natsuto Isogai

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Education

Doctoral Program in Physics *Apr. 2025 - Present*

Department of Physics, Graduate School of Science, The University of Tokyo
Supervisor: Prof. Mio Murao

Master's Program in Physics *Apr. 2023 - Mar. 2025*

Department of Physics, Graduate School of Science, The University of Tokyo
Supervisor: Prof. Mio Murao

Undergraduate Program in Physics *Apr. 2019 - Mar. 2023*

Department of Physics, Faculty of Science, Tokyo University of Science

Work

Internship (Quantum Algorithm Researcher) *Aug. 2026 - Sep. 2026*

JIJ Inc.

Fellowships

BOOST NAIS Program *Apr. 2025 - Present*

Teaching

Teaching Assistant *Apr. 2024 - Sep. 2024*

Computer Experiment I (計算機実験I), The University of Tokyo

Teaching Assistant *Apr. 2023 - Sep. 2023*

Computer Experiment I (計算機実験I), The University of Tokyo

Reviewing Activities

- **Journal:** Quantum
- **Conferences:** AQIS, QEC, QIP

Publications and Preprints

1. **Advantage of Sample Complexity in Quantum PAC Learning Requires Inverse Access to State-Preparation Unitaries**
   Natsuto Isogai, Satoshi Yoshida, and Mio Murao
   arXiv preprint arXiv:2609.38403, Sep 2026
   DOI | arXiv | HTML

2. **A Quantum-Inspired Dequantization Method for Diagonally Weighted Matrix Functions: Application to Learning with Optimized Random Features**
   Natsuto Isogai, Mio Murao, and Hayata Yamasaki
   arXiv preprint arXiv:2609.10729, Sep 2026
   DOI | arXiv | HTML

3. **Advantage of Quantum Machine Learning from General Computational Advantages**
   Hayata Yamasaki, Natsuto Isogai, and Mio Murao
   npj Quantum Information, Jul 2026
   DOI | arXiv | HTML

4. **Winning Lottery Tickets in Neural Networks via a Quantum-Inspired Classical Algorithm**
   Natsuto Isogai, Hayata Yamasaki, Sho Sonoda, and Mio Murao
   arXiv preprint arXiv:2605.13979, May 2026
   DOI | arXiv | HTML

Presentations

Contributed talks

1. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," 24th Asian Quantum Information Science Conference (AQIS 2024), Sapporo (Hokkaido University), August 2024.

2. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," 第49回量子技術研究会 (QIT49), Okinawa (OIST), December 2023.

Posters

1. N. Isogai, M. Murao, and H. Yamasaki, "A Quantum-Inspired Dequantization Method for Diagonally Weighted Matrix Functions: Application to Learning with Optimized Random Features," 26th Asian Quantum Information Science Conference (AQIS 2026), Daejeon (Korea), August 2026.

2. N. Isogai, H. Yamasaki, and M. Murao, "Learning with Optimized Random Feature: Quantum-Inspired Classical Sampling without Sparsity and Low-Rank Assumptions," Quantum Computing Theory in Practice (QCTiP) 2026, Oxford (United Kingdom), April 2026.

3. N. Isogai, H. Yamasaki, and M. Murao, "Learning with Optimized Random Feature: Quantum-Inspired Classical Sampling without Sparsity and Low-Rank Assumptions," 29th Quantum Information Processing Conference (QIP 2026), Riga (Latvia), January 2026.

4. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," Quantum Techniques in Machine Learning (QTML 2025), Singapore, November 2025.

5. N. Isogai, H. Yamasaki, and M. Murao, "Derandomization of Random Advice for Relational Problems in Heuristic Complexity," 25th Asian Quantum Information Science Conference (AQIS 2025), Hong Kong, August 2025.

6. N. Isogai, H. Yamasaki, and M. Murao, "Derandomization of Random Advice for Relational Problems in Heuristic Complexity," Quantum Innovation 2025, Osaka (Japan), July 2025.

7. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," International Conference on Quantum Computing, Paris (France), May 2025.

8. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," 28th Quantum Information Processing Conference (QIP 2025), Raleigh (USA), February 2025.

9. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," Quantum Innovation 2024, Tokyo (Japan), October 2024.

10. H. Yamasaki, N. Isogai, and M. Murao, "Advantage of Quantum Machine Learning from General Computational Advantages," Swiss-Japanese Quantum Symposium, Tokyo (The University of Tokyo), June 2024.