Koki Aoyama

Quantum computing · The University of Osaka

GitHub ORCID AtCoder Codeforces

Education

The University of Osaka — Graduate School of Information Science and Technology

Academic biography

Doctoral program in Computer Science, Ino Laboratory | Entered Apr 2024

Lab roster

Master’s program | Completed Mar 2024

Master’s thesis (Feb 2024) — CPIOsim: a Fast Quantum Circuit Simulator using a Tree Alignment of Completely-Positive Instrument Operations.

Thesis listing

Undergraduate studies in Information Science, School of Engineering Science | Through Mar 2022

Entered graduate school after the third undergraduate year.

Research and Industry Experience

Technical Assistant, Fujii Laboratory — Graduate School of Engineering Science, The University of Osaka (FY2022).

Laboratory roster

Part-time employee, ALGO ARTIS Corporation — Documented in 2024 and 2026.

2024 profile 2026 paper

Journal Articles

L. Placidi, R. Hataya, T. Mori, K. Aoyama, H. Morisaki, K. Mitarai, and K. Fujii. MNISQ: A Large-Scale Quantum Circuit Dataset for Machine Learning in the NISQ Era. Scientific Data 13, 810 (2026).

Article

Contributed to data preparation and experiments for a dataset of 4.95 million quantum circuits.

W. Inoue, K. Aoyama, Y. Teranishi, K. Kanno, Y. O. Nakagawa, and K. Mitarai. Almost optimal measurement scheduling of molecular Hamiltonian via finite projective plane. Physical Review Research 6, 013096 (2024).

Article

Preprints

K. Aoyama and F. Ino. Defect-Aware Parallel Atom Reloading Protocol for Neutral-Atom Quantum Computers. arXiv (2026).

arXiv:2609.38939 Code

Designed and implemented the reloading method. In low-noise simulations, average atom filling rose from 98.61% to 99.94%.

K. Aoyama, T. Tomita, and F. Ino. Square-root Time Atom Reconfiguration Plan for Lattice-shaped Mobile Tweezers. arXiv (2026).

arXiv:2604.05317 Code

Selected Conference and Technical Reports

K. Aoyama. Defect-Aware Atom Reloading Planning Algorithm for Neutral-Atom Quantum Computers. 40th Annual Conference of the Japanese Society for Artificial Intelligence (2026, in Japanese).
DOI

K. Aoyama, M. Okita, T. Tomita, and F. Ino. Square-Root Time Plan for Defect-Free Atom Array Reconfiguration with Lattice-shaped Mobile Tweezers. FTQCSA workshop at ISCA (2025).
Workshop program Related IPSJ report

K. Aoyama, M. Okita, and F. Ino. Eliminating Redundant Computation by Aggregating Execution Paths in Repeated Quantum Circuit Simulation [English translation]. IPSJ SIG Quantum Software (2022, in Japanese).
Technical report

Selected Presentations and Outreach

Quantum Information Technology Workshop (Nov 2026) — Sole-author poster on supplying defect-free atom arrays through selective column transfer. Numerical evaluation reported about a 1.4× speedup for 24 × 120 arrays.
Program and abstract

IPSJ Seminar Series (Jun 2024) — Spoke on connections between quantum computing and competitive programming and joined a panel on fault-tolerant architectures.
Program

Shijonawate High School (2023–2024) — Taught advanced algorithms in workshops for students preparing for the Japanese Olympiad in Informatics.
2023 school report 2024 materials

Software and Engineering Projects

Qookbook (FY2023 MITOU Target Program) — Developed a browser-based platform with automated grading for Python exercises and organized its first quantum heuristic contest in Jan 2024. The project report records at least 600 users and over 5,000 exercise submissions.
IPA project report

Amazon Braket Monitoring Tools (2022) — Co-developed open-source AWS utilities for monitoring quantum computing tasks.
AWS webinar Source

Parallel quantum circuit simulation — Reduced redundant computation in classical output sampling. A quantum Fourier transform benchmark ran about 2.6× faster on eight nodes than on one.
University research report

Honors and Competitive Programming

ASPLOS / EuroSys 2025 — Fourth place and Runner-Up award, Intra-Operator Parallelism for Distributed Deep Learning contest.
Results Solution

ICPC World Finals (2024) — Represented Osaka University in Astana on team kotamanegi_marunage.
University announcement Standings

ICPC Asia Yokohama Regional (2023) — Bronze medal, 4th of 58 teams.
Medal Rank

ISUCON11 Finals (2021) — Second in the student division as a solo entrant in a web performance contest.
Results

KLab Tenkaichi Game Battle Contest (2021) — Winner of both the spring and autumn editions.
Spring results Autumn results

6th Asprova Programming Contest (2020) — First overall.
AtCoder history

Japanese Olympiad in Informatics (2017–2018) — National Finals Excellence Award.
Results

Peak ratings — Codeforces 2,771 (International Grandmaster). AtCoder Algorithm 2,713 and Heuristic 2,470.
Heuristic profile

Coaching and Contest Service

ICPC coach, Osaka University (2024) — Coached teams that placed 12th and 20th at the Asia Yokohama Regional. Coached a team at the Taichung Regional that qualified for the 2025 Asia Pacific Championship.
Yokohama standings Coaching account Taichung

Otemae Programming Contest (2019) — Helped write contest problems.
School announcement