Jason D. Chadwick

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Education

Ph.D. Candidate, Computer Science, University of Chicago   2022–present
Studying quantum computer systems and architecture, advised by Fred Chong.
I am primarily interested in low-level software optimizations that narrow the gap between existing hardware and the future goal of large-scale fault-tolerant quantum computation. I have worked on research in the areas of error correction decoding, mitigating burst errors, control pulse engineering, device calibration, circuit compilation, and high-radix computation.

B.S. Physics, Carnegie Mellon University   2018–2022
Minor in Computer Science
GPA 3.95

Professional Experience

Quantum Computing Intern, Intel   Spring 2025–present
Quantum computer architecture research projects, with a focus on enabling near-term QEC on Intel hardware.

Quantum Computing Intern, Intel   Summer 2024
Discovered new pulse schedules for two-qubit operations in silicon spin qubits, yielding up to 54% reduction in errors and spurring the development of novel chip designs to take advantage of these gains. Incorporated this work into existing Python hardware interface and C++ compiler stack. Created compilation and simulation software for hardware-informed exploration of the QEC code design space, providing guidance for Intel's quantum roadmap. Currently preparing a first-author manuscript for publication.

Undergraduate Researcher, University of Chicago   Spring 2021–Summer 2022
Optimized short-duration control pulses for high-radix quantum logic gates, motivating a new compiler design that takes advantage of mixed-radix operations. Research was presented at QCE 2022 and was a key part of papers at ASPLOS 2023 and ISCA 2023.

Undergraduate Intern, Princeton Plasma Physics Laboratory   Summer 2020
As part of the Department of Energy SULI program, designed a neural network to predict fusion plasma cross-sectional density and pressure using only data available in real time during plasma operation, for use in real-time feedback control systems. Work published in *Nuclear Fusion*.

Programming

Languages: Python, Julia, C/C++
Python libraries: Stim/sinter, qiskit, Cirq, QuTiP
Software: HPC/slurm

Awards and Honors

QSYS Best Paper 1st place, IEEE QCE 2024   2024

QTEM Best Paper 3rd place, IEEE QCE 2023   2023

Crerar Fellowship, University of Chicago   2022
University Honors, Carnegie Mellon University   2022

College Honors, Mellon College of Science, Carnegie Mellon University   2022

Dean's List, High Honors, Mellon College of Science, Carnegie Mellon University   2018–2022

Service

Teaching Assistant, CMSC 22200 Computer Architecture   Winter 2025
Developed autograder and taught lab sessions.

Workshop organizer, QCE 2024   September 2024
Organized second edition of "Novel Applications of Optimal Control and Calibration for Quantum Technology" at QCE 2024, featuring invited talks and guided discussions.

Workshop organizer, QCE 2023   September 2023
Organized a day-long workshop "Advances in Numerical Quantum Optimal Control and Characterization Methods" at QCE 2023, featuring invited talks and guided discussions.

Physics Steering Committee, CMU Physics Department   2019–2021
Collaborated with physics department leadership to guide programs and policy.

Publications

[†] indicates equal contribution

Year	Title and Authors	Publisher	Category
2025	Erasure Minesweeper: exploring hybrid-erasure surface code architectures for efficient quantum error correction **J. D. Chadwick**[†], M. H. Teo[†], J. Viszlai[†], W. Yang[†], and F. T. Chong arxiv.org/abs/2505.00066	Under review	Refereed conference paper
2025	Operating two exchange-only qubits in parallel M. T. Mądzik, F. Luthi, G. G. Guerreschi, F. A. Mohiyaddin, F. Borjans, **J. D. Chadwick**, M. J. Curry, J. Ziegler, S. Atanasov, P. L. Bavdaz, E. J. Connors, J. Corrigan, H. Ekmel Ercan, R. Flory, H. C. George, B. Harpt, E. Henry, M. M. Islam, N. Khammassi, D. Keith, L. F. Lampert, T. M. Mladenov, R. W. Morris, A. Nethwewala, S. Neyens, R. Otten, L. P. O. Ibarra, B. Patra, R. Pillarisetty, S. Premaratne, M. Ramsey, A. Risinger, J. Rooney, R. Savytskyy, T. F. Watson, O. K. Zietz, A. Y. Matsuura, S. Pellerano, N. C. Bishop, J. Roberts, and J. S. Clarke arxiv.org/abs/2504.01191	Under review	Journal article
2025	Short two-qubit pulse sequences for exchange-only spin qubits in 2D **J. D. Chadwick**, G. G. Guerreschi, F. Luthi, M. T. Mądzik, F. A. Mohiyaddin, P. Prabhu, A. T. Schmitz, A. Litteken, S. Premaratne, N. C. Bishop, A. Y. Matsuura, and J. S. Clarke doi.org/10.1103/PhysRevA.111.052616	*Physical Review A* **111**, 052616	Journal article
2025	SWIPER: Minimizing Fault-Tolerant Quantum Program Latency via Speculative Window Decoding J. Viszai[†], **J. D. Chadwick**[†], S. Joshi, G. S. Ravi, Y. Li, and F. T. Chong doi.org/10.1145/3695053.3731022	52nd International Symposium on Computer Architecture (ISCA)	Refereed conference paper

2024	Averting multi-qubit burst errors in surface code magic state factories **J. D. Chadwick**, C. Kang, J. Viszlai, S. F. Lin, and F. T. Chong doi.org/10.1109/QCE60285.2024.00128 <u>QSYS Best Paper 1st place</u>	2024 IEEE International Conference on Quantum Computing and Engineering (QCE)	Refereed conference paper
2023	Efficient control pulses for continuous quantum gate families through coordinated re-optimization **J. D. Chadwick** and F. T. Chong doi.org/10.1109/QCE57702.2023.00145 <u>QTEM Best Paper 3rd place</u>	2023 IEEE International Conference on Quantum Computing and Engineering (QCE)	Refereed conference paper
2023	Dancing the Quantum Waltz: Compiling Three-Qubit Gates on Four Level Architectures A. Litteken, L. M. Seifert, **J. D. Chadwick**, N. Nottingham, J. M. Baker, and F. T. Chong doi.org/10.1145/3579371.3589106	50th International Symposium on Computer Architecture (ISCA)	Refereed conference paper
2023	Qompress: Efficient Compilation for Ququarts Exploiting Partial and Mixed Radix Operations for Communication Reduction A. Litteken, L. M. Seifert, **J. D. Chadwick**, N. Nottingham, J. M. Baker, and F. T. Chong doi.org/10.1145/3575693.3575726	28th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)	Refereed conference paper
2022	Time-Efficient Qudit Gates through Incremental Pulse Re-seeding L. M. Seifert[†], **J. D. Chadwick**[†], A. Litteken, F. T. Chong, and J. M. Baker doi.org/10.1109/QCE53715.2022.00051	2022 IEEE International Conference on Quantum Computing and Engineering (QCE)	Refereed conference paper
2021	Prediction of electron density and pressure profile shapes on NSTX-U using neural networks M. D. Boyer and **J. D. Chadwick** doi.org/10.1088/1741-4326/abe08b	*Nuclear Fusion* 61 046024	Journal article

Talks

Year	Title	Venue	Category
2025	Short two-qubit pulse sequences for exchange-only spin qubits in 2D	APS March Meeting 2025	Conference talk
2024	Averting multi-qubit burst errors in surface code magic state factories	2024 IEEE International Conference on Quantum Computing and Engineering (QCE)	Conference paper talk
2024	Dynamic mitigation of time-varying noise in surface code magic state factories	APS March Meeting 2024	Conference talk
2023	Efficient control pulses for continuous quantum gate families through coordinated re-optimization	2023 IEEE International Conference on Quantum Computing and Engineering (QCE)	Conference paper talk

Patents

Year	Title	Description
2023	SYSTEMS AND METHODS FOR OPTIMIZED PULSES FOR CONTINUOUS QUANTUM GATE FAMILIES THROUGH PARAMETER SPACE INTERPOLATION	Methods related to those described in "Efficient control pulses for continuous quantum gate families through coordinated re-optimization", *QCE 2023*.