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 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

Awards and Honors

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

Skills

Programming: Python, Julia, C/C++, C#/Unity, Java, Clojure, Common Lisp, SML, Bash

Python libraries: Stim, QuTiP, qiskit, Cirq, Pulser, pandas, TensorFlow, PyTorch

Julia packages: QuantumOptics, DataFrames, Juqbox

Software: Unix, slurm, Mathematica

Experience

Graduate Researcher, University of Chicago Summer 2022 – Present
Research in the areas of control pulse engineering, device calibration, circuit compilation, and high-radix computation. Advised by Fred Chong.

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.

Research 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*.

Service

Workshop organizer, QCE 2023 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

Year	Title and Authors	Publisher	Category
2023	Efficient control pulses for continuous quantum gate families through coordinated re-optimization *J. D. Chadwick and F. T. Chong* arxiv.org/abs/2302.01553 QTEM Best Paper (3rd place)	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 Reseeding *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

† indicates equal contribution

Patents

Year	Title	Description
2023 (pending)	SYSTEMS AND METHODS FOR OPTIMIZED PULSES FOR CONTINUOUS QUANTUM GATE FAMILIES THROUGH PARAMETER SPACE INTERPOLATION	Patent of methods described in “Efficient control pulses for continuous quantum gate fam- ilies through coordinated re-optimization”, *QCE 2023*.