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.
Research topics: quantum control, device calibration, circuit compilation, 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 2022

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

Skills

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

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

Julia packages: QuantumOptics.jl, DataFrames.jl, Juqbox.jl

Software: LaTeX, Unix, slurm, Mathematica

Experience

Graduate Researcher, University of Chicago Summer 2022 – Present
Research in the areas of quantum 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 resulted in papers at QCE 2022 and ASPLOS 2023 (to appear).

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 in real time, for use in control systems. Published work in *Nuclear Fusion*.

Featured Projects

visit my github to see all public projects

Chronodrifter, primary author 2021–present
2D platformer game in Unity where the player must solve puzzles by slowing and reversing the flow of time. A live web version is available at jason-chadwick/chronodrifter/ (mobile currently not supported).

Quops, primary author 2021–present
Board game based on the rules of quantum mechanics. Players take turns applying quantum logic operations to a board of qubit tiles, aiming to create specific superpositions of states.

Qiskit textbook, contributor 2022
Interactive open-source quantum computing textbook.

Juqbox.jl, contributor 2022
Julia package for solving optimal control problems in closed quantum systems.

Service

Workshop co-organizer, QCE 2023 2023
Co-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		Preprint
2023	(to appear) 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*	50th International Symposium on Computer Architecture (ISCA)	Refereed conferences paper
2023	(to appear) 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