

# Jason D. Chadwick

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## EDUCATION

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**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

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**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

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**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:**  $\text{\LaTeX}$ , Unix, slurm, Mathematica

## EXPERIENCE

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**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

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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.com/chronodrifter/](http://jason-chadwick.com/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

**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 <i>J.D. Chadwick and F.T. Chong</i> <a href="https://arxiv.org/abs/2302.01553">https://arxiv.org/abs/2302.01553</a>		Preprint
2023	(to appear) Qompress: Efficient Compilation for Ququarts Exploiting Partial and Mixed Radix Operations for Communication Reduction <i>A. Litteken, L.M. Seifert, J.D. Chadwick, N. Nottingham, J.M. Baker, and F.T. Chong</i> <a href="https://dl.acm.org/doi/10.1145/3575693.3575726">dl.acm.org/doi/10.1145/3575693.3575726</a>	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 <i>L.M. Seifert<sup>†</sup>, J.D. Chadwick<sup>†</sup>, A. Litteken, F.T. Chong, and J.M. Baker</i> <a href="https://doi.org/10.1109/QCE53715.2022.00051">doi.org/10.1109/QCE53715.2022.00051</a>	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 <i>M.D. Boyer and J.D. Chadwick</i> <a href="https://doi.org/10.1088/1741-4326/abe08b">doi.org/10.1088/1741-4326/abe08b</a>	<i>Nuclear Fusion</i> 61 046024	Journal

<sup>†</sup> indicates equal contribution

## CONFERENCE POSTERS

Year	Title and Authors	Publisher	Category
2022	Synthesizing Efficient Pulses for Practical Qudit Circuits <i>J. Baker, J.D. Chadwick, L.M. Seifert, A. Litteken, N. Nottingham, A. Petersson, S. Guenther, F.T. Chong</i>	25th Annual Conference on Quantum Information Processing (QIP)	Conference poster
2020	Machine learning modeling and analysis of density and pressure profiles on NSTX and NSTX-U <i>J.D. Chadwick, M.D. Boyer</i>	62nd Annual Meeting of the APS Division of Plasma Physics	Conference poster