

# Jason 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, data-driven characterization and control, compilation, high-radix computation

**B.S. Physics**, Carnegie Mellon University 2018–2022

Minor in Computer Science

GPA 3.95

Coursework: Quantum Computing, Advanced Quantum Physics, Computer Systems, Parallel Data Structures and Algorithms, Functional Programming, Discrete Differential Geometry, Artificial Intelligence

## AWARDS

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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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**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 has appeared at QCE 2022 and will appear at ASPLOS 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 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 [placeholder-studios-dev.github.io/chronodrifter](https://placeholder-studios-dev.github.io/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	<i>(to appear) Qompress: Efficient Compilation for Ququarts Exploiting Partial and Mixed Radix Operations for Communication Reduction</i> A. Litteken, L.M. Seifert, <b>J. Chadwick</b> , N. Nottingham, J.M. Baker, F.T. Chong	28th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)	Refereed conference paper
2022	<i>Time-Efficient Qudit Gates through Incremental Pulse Re-seeding</i> L.M. Seifert <sup>†</sup> , <b>J. Chadwick</b> <sup>†</sup> , A. Litteken, F.T. Chong, J.M. Baker <a href="https://arxiv.org/abs/2206.14975">arxiv.org/abs/2206.14975</a>	2022 IEEE International Conference on Quantum Computing and Engineering (QCE)	Refereed conference paper
2021	<i>Prediction of electron density and pressure profile shapes on NSTX-U using neural networks</i> M.D. Boyer, <b>J. Chadwick</b> <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	<i>Synthesizing Efficient Pulses for Practical Qudit Circuits</i> J. Baker, <b>J. Chadwick</b> , L.M. Seifert, A. Litteken, N. Nottingham, A. Petersson, S. Guenther, F.T. Chong	25th Annual Conference on Quantum Information Processing (QIP)	Conference poster
2020	<i>Machine learning modeling and analysis of density and pressure profiles on NSTX and NSTX-U</i> <b>J. Chadwick</b> , M.D. Boyer	62nd Annual Meeting of the APS Division of Plasma Physics	Conference poster