

Anthony Polloreno

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WORK EXPERIENCE

April 2019- August 2019

Quantum Engineer at Rigetti Quantum Computing

Calibrating and characterizing near-term superconducting quantum computers. Developing and testing more efficient routines for device bring-up, in particular using phase estimation routines to cheaply estimate DRAG parameters. Continuing to implement characterization routines like DirectRB. Simulation work done to validate routines done in Julia.

September 2018 - April 2019

Software Engineer at Rigetti Quantum Computing

Developing control software for bring-up, characterization, and calibration of the quantum computer. Primary responsibilities include maintaining and developing the software suite for experimental work through implementing new algorithms and APIs for easily accessing and using calibrated pulses and pulse sequences.

June 2016 - September 2018

Junior Quantum Engineer at Rigetti Quantum Computing

Full stack software engineering. Developed instrument drivers for vector network analyzers, and spectrum analyzers, implemented C++ drivers for matched filtering of RF signals, and was a primary developer and reviewer of the control software to run experiments and implement quantum programs, in Python. Developed internal tools for serving data from a PostgreSQL database using SQLAlchemy. Front end developed using HTML and Jinja in Python. Built functionality in Rigetti's quantum compiler, speeding up measurements in the simulator and implementing group theoretic routines for benchmarking and simulating quantum circuits, in Lisp. Wrote customer facing code to access the quantum computer (pyQuil and Grove), including implementing standard algorithms (e.g. Grover's Algorithm).

June-Aug 2014

Undergraduate Student Instructor for CS70 at U.C. Berkeley

Worked as an undergraduate student instructor under James Cook for the summer offering of a course in discrete mathematics and probability in the Computer Science department. Taught a discussion section of 10 students twice a week, held office hours, wrote homework and exam problems, and ran review sessions.

Jan-May 2014

Reader for CS61A at U.C. Berkeley

Graded homework, tests, and projects and held office hours for the introductory Computer Science course, taught by Paul Hilfinger.

RESEARCH EXPERIENCE

September 2018 - October 2018

Visiting Researcher at UT Austin

Random Quantum Circuits

Researching properties of random quantum circuits with Scott Aaronson. In particular, trying to prove that the probabilities for measuring different computational basis vectors following a random circuit are Porter-Thomas distributed.

June 2015 - Jan 2016

Student Intern at Sandia National Laboratories

Quantum Computation, Control and Error Correction

Did research with Kevin Young on using quantum optimal control to average away coherent noise using gradient-based methods (GRAPE) and optimization. Currently working to publish results.

July 2013 - July 2015

Student Assistant at Lawrence Berkeley National Laboratory

Beamline Optics, Reflection Zone Plates

Worked with Dmitriy Voronov to develop elliptical grating patterns called reflection zone plates which allow for more efficient beamline signal transmission in the Advanced Light Source. Used Python to generate patterns for the gratings as .cif files for use by electron beam and laser lithography machines.

Jan-May 2013

Undergraduate Research Apprenticeship at U.C. Berkeley

Animal Flight Laboratory, Hummingbird Flight

Worked with graduate student Marc Badger to investigate how hummingbirds navigate natural vegetation. Learned about avian flight as well as animal handling, and was introduced to basic experimentation techniques, Arduino usage, and Mathematica.

EDUCATION

Aug 2019 - Present	Ph.D. Candidate, Physics University of Colorado, Boulder	
Aug 2012 - May 2016	B.A., Computer Science, Physics, and Pure Mathematics University of California, Berkeley	GPA: 3.762

LANGUAGES AND FRAMEWORKS

Languages: Python, Common Lisp, SQL, \LaTeX , [Quil]

Frameworks: MPI, Docker, Postgres, AWS, Atlassian

RELEVANT COURSEWORK

Mathematics	Real/Complex Analysis (104/185) Linear Algebra (110) Set Theory (135)	Topology (202A) Abstract Algebra (113/250A) Functional Analysis (202B)
Physics	Electricity and Magnetism (110A) Classical Mechanics (105) Thermodynamics and Statistical Physics (112)	Quantum Mechanics (137A/137B/221A) Advanced Laboratory (111A/111B)
Computer Science	Algorithms (170) Combinatorics and Discrete Probability (174) Machine Learning (189)	Computability and Complexity (172) Quantum Computing (191C/294)

(1xx: upper division, 2xx: graduate)

TALKS/POSTERS

1. Anthony Polloreno, Nicholas Rubin, Robert Smith, and William Zeng. Random quantum circuits with varying topologies and gate sets. APS March Meeting, 2017
2. Anthony Polloreno, Nicholas Rubin, Robert Smith, and William Zeng. Random quantum circuits with varying topologies and gate sets. Southwest Quantum Information and Technology (SQuInT), 2017
3. Anthony Polloreno. Robust decorrelation of errors in quantum gates by random gate synthesis. *Bulletin of the American Physical Society*, 2019

PUBLICATIONS

1. M. Reagor, C. B. Osborn, N. Tezak, A. Staley, G. Prawiroatmodjo, M. Scheer, N. Alidoust, E. A. Sete, N. Didier, M. P. da Silva, E. Acala, J. Angeles, A. Bestwick, M. Block, B. Bloom, A. Bradley, C. Bui, S. Caldwell, L. Capelluto, R. Chilcott, J. Cordova, G. Crossman, M. Curtis, S. Deshpande, T. El Bouayadi, D. Girshovich, S. Hong, A. Hudson, P. Karalekas, K. Kuang, M. Lenihan, R. Manenti, T. Manning, J. Marshall, Y. Mohan, W. O'Brien, J. Otterbach, A. Papageorge, J. P. Paquette, M. Pelstring, A. Polloreno, V. Rawat, C. A. Ryan, R. Renzas, N. Rubin, D. Russell, M. Rust, D. Scarabelli, M. Selvanayagam, R. Sinclair, R. Smith, M. Suska, T. W. To, M. Vahidpour, N. Vodrahalli, T. Whyland, K. Yadav, W. Zeng, and C. T. Rigetti. Demonstration of universal parametric entangling gates on a multi-qubit lattice, 2017
2. S. Caldwell, N. Didier, C. A. Ryan, E. A. Sete, A. Hudson, P. Karalekas, R. Manenti, M. Reagor, M. P. da Silva, R. Sinclair, E. Acala, N. Alidoust, J. Angeles, A. Bestwick, M. Block, B. Bloom, A. Bradley, C. Bui, L. Capelluto, R. Chilcott, J. Cordova, G. Crossman, M. Curtis, S. Deshpande, T. El Bouayadi, D. Girshovich, S. Hong, K. Kuang, M. Lenihan, T. Manning, J. Marshall, Y. Mohan, W. O'Brien, C. Osborn, J. Otterbach, A. Papageorge, J. P. Paquette, M. Pelstring, A. Polloreno, G. Prawiroatmodjo, V. Rawat, R. Renzas, N. Rubin, D. Russell, M. Rust, D. Scarabelli, M. Scheer, M. Selvanayagam, R. Smith, A. Staley, M. Suska, N. Tezak, T. W. To, M. Vahidpour, N. Vodrahalli, T. Whyland, K. Yadav, W. Zeng, and C. Rigetti. Parametrically-activated entangling gates using transmon qubits, 2017
3. Sabrina S. Hong, Alexander T. Papageorge, Prasahnt Sivarajah, Genya Crossman, Nicolas Dider, Anthony M. Polloreno, Eyob A. Sete, Stefan W. Turkowski, Marcus P. da Silva, and Blake R. Johnson. Demonstration of a parametrically-activated entangling gate protected from flux noise, 2019

4. C. M. Wilson, J. S. Otterbach, N. Tezak, R. S. Smith, A. Polloreno, G. E. Crooks, and M. P. da Silva. Quantum kitchen sinks: An algorithm for machine learning on near-term quantum computers, 2019. Update with Experimental Results In Progress
5. A. Polloreno and K. Young. Robust decorrelation of errors in quantum gates by random gate synthesis, 2019. Under Review by Sandia National Laboratories