Anthony Polloreno

gmail: ampolloreno

EDUCATION

Aug 2019 - Present	**Ph.D. Student, Physics** University of Colorado, Boulder GPA: 3.83
Aug 2012 - May 2016	**B.A., Computer Science, Physics, and Pure Mathematics** University of California, Berkeley GPA: 3.76

RESEARCH EXPERIENCE

May 2021 - Present	Graduate Student Intern at **Sandia National Laboratories** *Quantum Error Correction* Did research with Robin Blume-Kohout, Kevin Young and the QPL on understanding the map from physical error processes to logical error processes, and identifying physical quantities that are predictive of logical performance.
Aug 2019 - Present	Graduate Student at **JILA** and **University of Colorado, Boulder** *Quantum Information* Graduate student in the Smith and Rey groups.
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 - January 2016	Student Intern at **Sandia National Laboratories** *Quantum Computation and Control* Did research with Kevin Young on using quantum optimal control to average away coherent error using gradient-based methods (GRAPE) and optimization.
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.
January 2013 - 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.

WORK EXPERIENCE

April 2019 - December 2019	**Software Engineer at Ψ-inf** Software engineering consultant building infrastructure for scientific computing companies.
June 2016 - August 2019	**Quantum Engineer at Rigetti Quantum Computing** Calibrating and characterizing near-term superconducting quantum computers ($\leq$ 32 qubits). Developing and testing more efficient routines for device bring-up, simulation work done to validate routines done in Julia. Maintained and developed the software suite for experimental work, including APIs for easily accessing and using calibrated pulses and pulse sequences. 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. 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).

TEACHING EXPERIENCE

January 2020 - June 2020	**Grader for Physics 4230 at C.U. Boulder** Graded homework and quizzes for upper division, thermodynamics and statistical mechanics with Oliver DeWolfe.
January 2020 - June 2020	**Teaching Assistant for Physics 2020 C.U. Boulder** Taught two sections of introductory experimental physics for non-majors. Course taught by Colin West.
August 2019 - December 2019	**Teaching Assistant for Physics 1110 and 1115 at C.U. Boulder** Taught three sections of introductory general physics, one for majors. Led tutorial sections introducing students to ideas in kinematics and dynamics and graded homework. Course taught by Daniel Bolton, Cindy Regal, and Shijie Zhong.
August 2019 - December 2019	**Grader for Physics 4410 at C.U. Boulder** Graded homework and quizzes for upper division, second-semester quantum mechanics with Andreas Becker.
June 2014 - August 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.
January 2014 - 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.

AWARDS AND SCHOLARSHIPS

April 2021	NASA Space Technology Graduate Research Opportunity (NSTGRO) Fellowship
February 2021	QISE-NET Award (Cohort 4)
Dec 2019	C.U. Boulder Domestic Graduate Travel Grant
March 2016	C.U. Boulder Graduate Dean's Fellowship (Awarded)
Dec 2014	Pomerantz Physics Scholarship
Aug 2012	U.C. Berkeley Regents' and Chancellor's Scholarship

PROGRAMMING LANGUAGES AND FRAMEWORKS

Languages: Python, Mathematica, Julia, Common Lisp, SQL, LaTeX, $|$Quil$\rangle$

Frameworks & Tools: MPI, Docker, Postgres, AWS, Atlassian

Patents

1. Alexander Papageorge, Benjamin Jacob Bloom, Anthony Polloreno, Sabrina Sae Byul Hong, and Nasser Alidoust. Operating a quantum processor having a three-dimensional device topology. Library Catalog: Google Patents

Publications

1. Anthony M. Polloreno and Kevin C. Young. Robustly decorrelating errors with mixed quantum gates, 2020

2. Sabrina S. Hong, Alexander T. Papageorge, Prasahnt Sivarajah, Genya Crossman, Nicolas Didier, 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. *Physical Review A*, 101(1), January 2020

3. C. M. Wilson, J. S. Otterbach, N. Tezak, R. S. Smith, A. M. Polloreno, Peter J. Karalekas, S. Heidel, M. Sohaib Alam, G. E. Crooks, and M. P. da Silva. Quantum kitchen sinks: An algorithm for machine learning on near-term quantum computers, 2018

4. S. A. Caldwell, N. Didier, C. A. Ryan, E. A. Sete, A. Hudson, P. Karalekas, R. Manenti, 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, A. Marchenkov, J. Marshall, R. Maydra, Y. Mohan, W. O'Brien, C. Osborn, J. Otterbach, A. Papageorge, J.-P. Paquette, M. Pelstring, A. Polloreno, G. Prawiroatmodjo, V. Rawat, M. Reagor, R. Renzas, N. Rubin, D. Russell, M. Rust, D. Scarabelli, M. Scheer, M. Selvanayagam, R. Smith, A. Staley, M. Suska, N. Tezak, D. C. Thompson, T.-W. To, M. Vahidpour, N. Vodrahalli, T. Whyland, K. Yadav, W. Zeng, and C. Rigetti. Parametrically activated entangling gates using transmon qubits. *Physical Review Applied*, 10(3), September 2018

5. Matthew Reagor, Christopher B. Osborn, Nikolas Tezak, Alexa Staley, Guenevere Prawiroatmodjo, Michael Scheer, Nasser Alidoust, Eyob A. Sete, Nicolas Didier, Marcus P. da Silva, Ezer Acala, Joel Angeles, Andrew Bestwick, Maxwell Block, Benjamin Bloom, Adam Bradley, Catvu Bui, Shane Caldwell, Lauren Capelluto, Rick Chilcott, Jeff Cordova, Genya Crossman, Michael Curtis, Saniya Deshpande, Tristan El Bouayadi, Daniel Girshovich, Sabrina Hong, Alex Hudson, Peter Karalekas, Kat Kuang, Michael Lenihan, Riccardo Manenti, Thomas Manning, Jayss Marshall, Yuvraj Mohan, William O'Brien, Johannes Otterbach, Alexander Papageorge, Jean-Philip Paquette, Michael Pelstring, Anthony Polloreno, Vijay Rawat, Colm A. Ryan, Russ Renzas, Nick Rubin, Damon Russel, Michael Rust, Diego Scarabelli, Michael Selvanayagam, Rodney Sinclair, Robert Smith, Mark Suska, Ting-Wai To, Mehrnoosh Vahidpour, Nagesh Vodrahalli, Tyler Whyland, Kamal Yadav, William Zeng, and Chad T. Rigetti. Demonstration of universal parametric entangling gates on a multi-qubit lattice. *Science Advances*, 4(2):eaao3603, February 2018

Talks/Posters

1. Anthony Polloreno and Kevin Young. Robustly decorrelating errors with mixed quantum gates. Southwest Quantum Information and Technology (SQuInT), 2020

2. Anthony Polloreno. Robust decorrelation of errors in quantum gates by random gate synthesis. *Bulletin of the American Physical Society*, 2019

3. 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

4. Anthony Polloreno, Nicholas Rubin, Robert Smith, and William Zeng. Random quantum circuits with varying topologies and gate sets. APS March Meeting, 2017