
Appointments

- 2022 — **École Polytechnique Fédérale de Lausanne.**
Postdoctoral scientist.

Education

- 2022 **Michigan State University.**
Ph.D. in Computational Mathematics, Science, and Engineering.
- 2017 **University of Michigan, Ann Arbor.**
B.S. with Distinction in Mathematics and Physics.

Research experience

- 2020 & 2021 **Alphabet (Google) X, Quantum Resident,** Mountain View, CA.
Simulating (noisy) quantum circuits with tensor networks.
- 2020 — 2022 **Unitary Fund, Technical Staff Member.**
Research and software development for quantum error mitigation.
- 2019 **NASA Ames, Intern, Quantum Artificial Intelligence Laboratory,** Mountain View, CA.
Quantum compiling, QAOA applications, and error mitigation.
- 2019 **IBM, Quantum Computing Applications Researcher (Intern),** T.J. Watson Research Center, NY.
Quantum algorithms for linear systems of equations.
- 2018 **Los Alamos National Laboratory, Quantum Computing Summer School,** Los Alamos, NM.
Variational quantum algorithms.
- 2017 **University of Michigan, Undergraduate Research Assistant,** Quantum Info. Group (Yaoyun Shi).
Introduction to quantum computation and quantum simulation.

Teaching experience

- 2022 **QUANT 400: Introduction to quantum science and technology, EPFL.**
Teaching assistant (Instructor: Dr. Giuseppe Carleo et al).
- 2021 **CMSE 890: Quantum computing and quantum algorithms, Michigan State University.**
Teaching assistant (Instructor: Dr. Alexei Bazavov).
- 2019 **Quantum machine learning, edX, University of Toronto.**
Chief Community Moderator for 4000+ students (Instructor: Dr. Peter Wittek).
- 2019 **CMSE 201: Introduction to computational modeling, Michigan State University.**
Teaching assistant (Instructor: Dr. Devin Silvia).
- 2018 **CMSE 202: Computational modeling tools and techniques, Michigan State University.**
Teaching assistant (Section 001 - Instructor: Dr. Devin Silvia and Section 002 Instructor: Dr. Pierson Guthry).

Other experience

- 2020 **Adecco @ Google, Developer III.**
Open-source software and documentation for quantum computing.
- 2017 **University of Michigan, Ann Arbor, Academic Mentor,** Academic Success/Bridge Scholars Programs.
Tutoring for undergraduate courses in mathematics, physics, and computer science.

2015–2017 **University of Michigan, Ann Arbor**, Grader, Department of Mathematics.
Math 450, Advanced Engineering Mathematics (Summer 2016, Fall 2016, Winter 2017).
Math 316, Differential Equations (Fall 2015 and Winter 2016).

Journal publications

Google scholar: <https://scholar.google.com/citations?user=BLerRseAAAAAJ>

- 2022 Manqoba Q. Hlatshwayo, Yinu Zhang, Herlik Wibowo, **Ryan LaRose**, Denis Lacroix, and Elena Litvinova, Simulating excited states of the Lipkin model on a quantum computer, *Phys. Rev. C* **106**, 024319.
- 2020 **Ryan LaRose**, Andrea Mari, Sarah Kaiser, Peter J. Karalekas, Andre A. Alves, Piotr Czarnik, Mohamed El Mandouh, Max H. Gordon, Yousef Hindy, Aaron Robertson, Purva Thakre, Misty Wahl, Danny Samuel, Rahul Mistri, Maxime Tremblay, Nick Gardner, Nathaniel T. Stemen, Nathan Shammah, and William J. Zeng, Mitiq: A software package for error mitigation on noisy quantum computers, *Quantum* **6**, 774.
- 2022 **Ryan LaRose**, Eleanor Rieffel, and Davide Venturelli, Mixer-phaser ansätze for quantum optimization with hard constraints, *Quantum Mach. Intell.* **4**, 17.
- 2020 T. Giurgica-Tiron, Y. Hindy, **R. LaRose**, A. Mari and W. J. Zeng, Digital zero noise extrapolation for quantum error mitigation, *2020 IEEE International Conference on Quantum Computing and Engineering (QCE)*, 2020, pp. 306-316.
- 2020 **Ryan LaRose** & Brian Coyle, Robust data encodings for quantum classifiers, *Phys. Rev. A* **102**, 032420.
- 2019 **Ryan LaRose**, Arkin Tikku, Étude O’Neel-Judy, Lukasz Cincio, and Patrick J. Coles, Variational quantum state diagonalization, *npj Quantum Inf* **5**, 57.
- 2019 Sumeet Khatri, **Ryan LaRose**, Alexander Poremba, Lukasz Cincio, Andrew T. Sornborger, and Patrick J. Coles, Quantum-assisted quantum compiling, *Quantum* **3**, 140.
- 2019 **Ryan LaRose**, Overview and comparison of gate level quantum software platforms, *Quantum* **3**, 130.

Pre-print publications

- 2022 **Ryan LaRose**, Hong-Ye Hu, Yi-Zhuang You, Zhihui Wang, and Eleanor Rieffel, Logical shadow tomography: Efficient estimation of error-mitigated observables, arXiv:2203.07263.
- 2022 **Ryan LaRose**, Andrea Mari, Vincent Russo, Dan Strano, William J. Zeng, Error mitigation increases the effective quantum volume of quantum computers, arXiv:2203.05489.
- 2022 Kevin Schultz, **Ryan LaRose**, Andrea Mari, Gregory Quiroz, Nathan Shammah, Dave Clader, and Will Zeng, Reducing impact of time-correlated noise on zero-noise extrapolation, arXiv:2201.11792.
- 2019 Carlos Bravo-Prieto, **Ryan LaRose**, M. Cerezo, Yigit Subasi, Lukasz Cincio, and Patrick J. Coles, Variational quantum linear solver: A hybrid algorithm for linear systems, arXiv:1909.05820.
- 2018 **Ryan LaRose**, Distributed memory techniques for classical simulation of quantum circuits, arXiv:1801.01037.

Writing

- 2021 **Ryan LaRose**, Eric Kessler, Peter Karalekas, and Nathan Shammah, Exploring quantum error mitigation with Mitiq and Amazon Braket, AWS Quantum Computing Blog. <https://aws.amazon.com/blogs/quantum-computing/>.

Software development

- 2020 — 2022 **Mitiq**, <https://github.com/unitaryfund/mitiq>, Lead developer.
Quantum error mitigation toolkit for noisy, intermediate-scale quantum computers.

Invited presentations

- 2022 **Gemini Autumn school on quantum computation**, Oslo, Norway.
Quantum computing and quantum algorithms.

- 2022 **SQMS/GGI summer school on quantum simulation of field theories**, *Galileo Galilei Institute*.
Quantum error correction and quantum mitigation.
- 2022 **Control club**, *Forschungszentrum Jülich*.
Logical shadow tomography: Efficient estimation of error-mitigated observables.
- 2022 **FRIB-TA Quantum computing for nuclear physics summer school**, *Michigan State University*.
Quantum error correction and quantum error mitigation.
- 2022 **QC Hack 2022**, *Stanford, Yale, Duke, UC Berkeley*.
Innovations in quantum computing roundtable.
- 2022 **Quantum seminar series**, *Brookhaven National Lab*.
Quantum error mitigation.
- 2021 **Constraint solving and quantum computing (workshop)**, *27th International Conference on Principles and Practice of Constraint Programming*.
Quantum computing for computer scientists.
- 2021 **The past, present and future of quantum error correction (short school)**, *UC Berkeley*.
Decoding algorithms for quantum error correction.
- 2021 **Quantum computing meetup**, *Duke University*.
Variational algorithms and quantum error mitigation.
- 2021 **Cirq bootcamp**, *University of Tokyo, Osaka University, & QunaSys*.
Research & experiments using Cirq.
- 2021 **Quantum research seminars Toronto**, *Centre for Quantum Information and Quantum Control, University of Toronto*.
Quantum error mitigation in practice.
- 2020 **Quantum linear algebra minisymposium**, *SIAM Annual Meeting (AN20)*, Toronto, CA.
*Cancelled due to Covid-19.
- 2020 **Rigetti advantage day**, *Rigetti Computing, Sacramento, CA*.
Variational quantum linear solver on Rigetti Aspen-7.
- 2020 **FOSDEM 2020, Quantum computing devroom**, *Université Libre de Bruxelles, Brussels, Belgium*.
Quantum classifiers, robust data encodings, and software to implement them.
- 2020 **Quantum computing short course**, *Air Force Institute of Technology (AFIT), Dayton, Ohio*.
The stabilizer formalism and quantum subspace expansion.
- 2019 **CME250Q: Intro. to quantum computing and quantum algorithms**, *Stanford, Palo Alto, Ca*.
[Guest Lecture] Quantum algorithms for linear systems of equations.

Contributed presentations

- 2022 **Midwest quantum collaboratory**, *University of Michigan, Ann Arbor..*
[Poster] Logical shadow tomography: Efficient estimation of error-mitigated observables.
- 2021 **APS March Meeting**.
Mitiq: A software package for error mitigation on noisy quantum computers.
- 2020 **4th International Workshop on Quantum Compilation**, *Cambridge Quantum Computing [Virtual]*.
Mitiq: A software package for error mitigation on noisy quantum computers.
- 2020 **SQuInT 2020**, *University of Oregon, Eugene, Washington*.
[Poster] Variational quantum linear solver.
- 2019 **Quantum techniques in machine learning**, *KAIST, Daejeon, South Korea*.
Robust data encodings for quantum classifiers.
- 2019 **IBM Quantum Research Seminar**, *Thomas J. Watson Research Center, Yorktown Heights, NY*.
Quantum singular value estimation and its applications.
- 2019 **APS March Meeting**, *Boston, MA*.
Quantum software platforms.
- 2019 **FOSDEM 2019, Quantum computing devroom**, *Université Libre de Bruxelles, Brussels, Belgium*.
Towards Practical Quantum machine learning with NISQAI.

- 2019 **Quantum Information Processing**, *University of Colorado Boulder*.
[Poster] Variational quantum state diagonalization.
- 2018 **Quantum Information and Computation Seminar**, *Michigan State University*.
Quantum technologies in the second quantum revolution. Inaugural presentation of weekly seminar.
- 2018 **Quantum Information Science Workshop**, *Michigan State University*.
[Poster] Quantum-assisted quantum compiling. Runner-up for best poster presentation.
- 2018 **4th International Conference for Young Quantum Information Scientists**, *University of Vienna*.
[Poster] Overview and Comparison of Gate Level Quantum Software Platforms
- 2018 **Information Science & Technology Institute Summer School Presentations**, *Los Alamos, NM*.
Variational quantum state diagonalization.
- 2018 **Los Alamos National Laboratory Student Symposium**, *Los Alamos, New Mexico*.
[Poster] Quantum-assisted quantum compiling. Recipient of 2018 Outstanding Poster Presentation in Physics.
- 2018 **APS April Meeting**, *Columbus, Ohio*.
Distributed memory techniques for classical simulation of quantum circuits.
- 2018 **Engineering Research Symposium**, *Michigan State University*.
[Poster] Distributed memory techniques for classical simulation of quantum circuits.
- 2018 **Graduate Academic Conference**, *Michigan State University*.
Quantum teleportation with photons.
- 2017 **Quantum Information Processing Seminar**, *University of Michigan, Ann Arbor*.
Optical simulation of quantum information: simplifying the teleportation circuit with timing qubits.
- 2017 **Quantum Information Processing Seminar**, *University of Michigan, Ann Arbor*.
Introduction to digital and analog quantum simulation.

Referee for journals

Quantum, Physical Review A, IEEE Transactions on Quantum Engineering, EPJ Quantum Technology, Quantum Science and Technology, IOP Publishing, Machine Learning: Science and Technology, Quantum Information and Computation, Rinton Press, PLOS ONE, IEEE Computing in Science and Engineering (CiSE), Neuromorphic Computing and Engineering, IOP Publishing.

Professional activities

- 2021 **Lead Organizer**, *Sixth International Conference for Young Quantum Information Scientists (YQIS)*, Michigan State University, April 12-16, 2021.
- 2021 **Lecturer**, *Introduction to Cirq*, QC Talk, Faculdade de Engenharia da Universidade do Porto.
- 2020 **Lecturer**, *Tutorial on Cirq for NISQ: Research and education*, *IEEE Quantum Week*.
- 2020 **Instructional Assistant**, *Python bootcamp for non-engineers*, Google, New York, NY.
- 2019 **Lead Organizer**, *MSU-IBM Quantum Computing Bootcamp with Qiskit*, Michigan State University, October 18-19, 2019., Conference website: <https://egr.msu.edu/qcbq>.
Tutorials and talks: <https://github.com/rmlarose/qcbq>
- 2019 **Presenter**, *Time for Quantum*, Michigan State University Science Festival (Science outreach).
- 2018– **Co-Founder and Organizer**, *Quantum Information and Computation (QuIC) Seminar*, MSU.
Website: <https://www.ryanlarose.com/quic-seminar.html>
- 2019 **Presenter**, *CMSE Exhibition*, Michigan State University Science Festival (Science outreach).

Awards, Grants, and Prizes

- 2022 **AWS Research Credits**.
\$25k in credits.
- 2021 **IonQ Research Credits**.
\$10k in credits for proposal: “Quantum error mitigation in practice.”
- 2019 **NSF Student Travel Grant**, *TQC + NISQ 2019*, University of Maryland.

- 2019 **Qiskit Hackathon Winner**, *Qiskit Camp Conference at IBM*.
Implemented analytic gradient descent algorithms in Qiskit Aqua for optimization in variational quantum algorithms. Selected winner out of 20+ projects by judges.
- 2019 **Disciplinary Leadership Award**, *Michigan State University, Council of Graduate Students*.
\$2k for advancing quantum information science research at Michigan State University.
- 2019 **CMSE Research Travel Grant**.
\$1k for presenting research at conferences.
- 2019 **NSF Student Travel Grant**, *QIP 2019*, University of Colorado, Boulder, Colorado.
- 2018 **Unitary Fund Grant**.
\$2k for open-source quantum software development.
- 2018 **Travel Scholarship for YQIS 2018**, *Erwin Schrödinger Institute for Mathematics and Physics*.
- 2018 **CMSE Research Travel Grant**.
\$1k for presenting research at conferences.
- 2017 **Jackier Prize**, *University of Michigan*.
- 2013 **William J. Branstrom Freshman Prize**, *University of Michigan*.

Scholarships, Fellowships, and Distinctions

- 2020 **NASA Space Technology Graduate Research Opportunity (NSTGRO) Fellowship**.
\$80k/year for up to 4 years of PhD. Proposal: “Making quantum computers less noisy and more useful.”
- 2020 **Fitch H. Beach Award for Outstanding Graduate Research**, *College of Engineering, MSU*.
“Recognizes the most outstanding graduate researchers within the College of Engineering. Each department nominates one PhD student, and awards are based on a review of students’ academic and professional records.”
- 2019 **Future Academic Scholars in Teaching (FAST) Fellowship**, *Michigan State University*.
[Declined] \$2k for quantum computing education research and curriculum development at MSU.
- 2018 **Quantum Computing Summer School Fellowship**, *Los Alamos National Laboratory*.
1/10 awarded internationally.
- 2017 **Engineering Distinguished Fellowship**, *Michigan State University*.
- 2017 **Phi Beta Kappa**, *Alpha of Michigan Chapter*.
- 2017 **James B. Angell Scholar**, *University of Michigan*.
- 2017 **Bachelor of Science with Distinction**, *University of Michigan*.
- 2013–2016 **University Honors**, *University of Michigan*.
- 2016 **James B. Angell Scholar**, *University of Michigan*.
- 2013 **Michigan Competitive Scholarship**.
- 2013 & 2016 **M-PACT Scholarship**, *University of Michigan*.