

Ryan LaRose

Michigan State University

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Education

2017– **Michigan State University.**
Ph.D. in Physics and Computational Mathematics, Science, and Engineering.

2013–2017 **University of Michigan, Ann Arbor.**
B.S. with Distinction in Physics and Mathematics.

Research Directions

Quantum algorithm engineering for near-term quantum computers.

Quantum-assisted machine learning.

Research Experience

2019 **IBM Research**, *Quantum Computing Applications Researcher (Intern)*, Yorktown Heights, NY.

2018 **Los Alamos National Laboratory**, *Quantum Computing Summer School.*

Hybrid quantum-classical algorithms for near-term quantum computers.

Co-mentored by Patrick Coles and Lukasz Cincio.

One of ten students selected internationally for first ever summer school.

2017– **Michigan State University**, *Research Assistant*, CEDAR Team led by Dr. Matthew Hirn.

Machine learning for quantum algorithms.

Quantum-assisted machine learning.

2016–2017 **University of Michigan, Ann Arbor**, *Undergraduate Research Assistant*, Quantum Information Group led by Dr. Yaoyun Shi.

Attended weekly seminars and guided reading on quantum information/quantum computation.

Introduced group to digital and analog quantum simulation.

Summer 2016 **Michigan Technological Research Institute**, *Intern*, Sensor and Signal Processing Lab.

& 2017 Machine learning for subsurface imaging classification, signal processing.

Improved and developed codebases, implemented algorithms, developed mathematical models.

Teaching Experience

Spring 2019 **CMSE 201: Introduction to Computational Modeling**, *Michigan State University.*

TA for Section 002 (Instructor: Dr. Devin Silvia).

Fall 2018 **CMSE 202: Computational Modeling Tools and Techniques**, *Michigan State University.*

TA for Sections 001 (Instructor: Dr. Devin Silvia) and 002 (Instructor: Dr. Pierson Guthry).

Work and Leadership Experience

Summer 2017 **University of Michigan, Ann Arbor**, *Academic Mentor*, Academic Success Program and Summer Bridge Scholars Program.

Daily individualized tutoring sessions for academically at-risk students.

Tutoring by appointment for mathematics, computer science, and physics.

2015–2017 **University of Michigan, Ann Arbor**, *Grader*, Department of Mathematics.

Math 316, Differential Equation, Fall 2015 and Winter 2016.

Math 450, Advanced Engineering Mathematics, Summer 2016, Fall 2016, Winter 2017.

Publications

2018 **Ryan LaRose**, Arkin Tikku, Étude O'Neel-Judy, Lukasz Cincio, and Patrick J. Coles, Variational quantum state diagonalization, arXiv:1810.10506, 2018.

- 2018 Sumeet Khatri, **Ryan LaRose**, Alexander Poremba, Lukasz Cincio, Andrew T. Sornborger, and Patrick J. Coles, Quantum-assisted quantum compiling, arXiv:1807.00800, 2018.
- 2018 **Ryan LaRose**, Overview and comparison of gate level quantum software platforms, arXiv:1807.02500, 2018.
- 2018 **Ryan LaRose**, Distributed memory techniques for classical simulation of quantum circuits, arXiv:1801.01037, 2018.

Software Development

- 2018- **NISQAI**, <https://github.com/quantumai-lib/nisqai>, Lead developer.
Open-source Python/Matlab platform for quantum neural networks on near-term quantum computers. Currently under development. Recipient of the Unitary Fund Grant.

Presentations

- 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 **Fourth Annual International Conference for Young Quantum Information Scientists**, *University of Vienna, Austria*.
[Poster] Overview and Comparison of Gate Level Quantum Software Platforms
- 2018 **Information Science & Technology Institute Summer School Presentations**, *Los Alamos, New Mexico*.
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.

Workshops and/or Tutorials Attended

- 2018 **Schrödinger's Class**, *Institute for Quantum Computing, University of Waterloo, Waterloo, Canada*.
- 2018 **Quantum Information Science Workshop**, *Michigan State University, East Lansing, Michigan*.
- 2018 **International Conference for Young Quantum Information Scientists (YQIS) and Summer School of the Vienna Doctoral Program on Complex Quantum Systems (CoQuS)**, *University of Vienna, Vienna, Austria*.
- 2018 **Quantum Information Workshop**, *APS March Meeting, Los Angeles, California*.
- 2018 **Hybrid Quantum Systems Workshop**, *APS March Meeting, Los Angeles, California*.

Professional Activities

- 2018 Co-Founder and Co-Organizer, Quantum Information and Computation (QuIC) Seminar at MSU.
- 2018 Co-Founder and Co-Organizer, Graduate Student Seminar Series (GS3) through the Michigan State University SIAM Chapter.
- 2018 Assistant Volunteer Presenter, Michigan State University Science Festival.
- 2017 Assistant Volunteer Organizer, Frontiers in Computing and Data Science.

Professional Affiliations

- 2018– Society for Industrial and Applied Mathematics (SIAM).
- 2017– American Physical Society.
- 2017– American Mathematical Society.
- 2017– IEEE.

Programming Languages

- Experienced Python, Matlab.
- Intermediate C, C++.
- Quantum Software ProjectQ (experienced), QISKit (intermediate), pyQuil (intermediate), Cirq (intermediate).

Certifications in Online Courses

- 2018 **The Quantum Internet and Quantum Computers**, *Delft University of Technology*, edX.

Awards, Grants, and Prizes

- 2019 **CMSE Research Travel Grant**.
\$1k for presenting research at conferences.
- 2019 **QIP Student Support Travel Grant**.
- 2018 **Unitary Fund Grant**.
\$2k for open-source quantum software development.
- 2018 **Travel Scholarship for YQIS 2018 Conference**, *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

- 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*.
2+ consecutive terms of all A grades.
- 2017 **Bachelor of Science with Distinction**, *University of Michigan*.
- 2013–2016 **University Honors**, *University of Michigan*.
- 2016 **James B. Angell Scholar**, *University of Michigan*.
2+ consecutive terms of all A grades.
- 2013 **Michigan Competitive Scholarship**.

References

Matthew Hirn, *Assistant Professor*, Michigan State University, PhD Advisor.

Department of Computational Mathematics, Science, and Engineering and Department of Mathematics.
mhirn@msu.edu

Patrick Coles, *Scientist 2, T-4 Division*, Los Alamos National Laboratory, Summer School Mentor.

pcoles@lanl.gov

Yaoyun Shi, *Professor*, University of Michigan, Undergraduate Research Advisor.

Department of Electrical Engineering and Computer Science.

Vice President and Chief Scientist of Quantum Technologies, Alibaba group.

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