

# Ruslan Shaydulin

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

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## Profile

An expert in quantum information science. My research focuses on applying quantum computers to problems in optimization and machine learning. I have extensive experience in all aspects of designing and implementing quantum and hybrid quantum-classical algorithms from theoretical analysis to error mitigation.

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## Work Experience

**Executive Director, Applied Research Director, JPMorgan Chase & Co.** **Winter 2024 - Present**

**Vice President, Applied Research Lead, JPMorgan Chase & Co.** **Spring 2022 - Winter 2024**

- Quantum algorithms researcher at the Global Technology Applied Research center

**Maria Goeppert Mayer fellow – Argonne Scholar, Argonne National Laboratory** **Fall 2020 - Spring 2022**

- Working on quantum optimization and quantum machine learning with focus on DOE applications
- Recipient of prestigious and selective postdoctoral fellowship ([< 5 awarded annually](#))

**Research Intern, IBM Research – Quantum** **Summer 2020**

- Developed and implemented a novel approach for Clifford circuit optimization in collaboration with Sergey Braviy, Dmitri Maslov and Shaohan Hu ([arXiv:2105.02291](https://arxiv.org/abs/2105.02291), patent application [US20220129411A1](https://patents.google.com/patent/US20220129411A1))
- Selected as one of four interns to be [highlighted in a promotional video](#) on the basis of performance

**Intern, Quantum Artificial Intelligence Lab (QuAIL)** **Spring 2020**

**NASA Ames Research Center (KBR)**

- Developed novel analysis connecting the symmetries in problem instance structure to the performance of Quantum Approximate Optimization Algorithm in collaboration with Stuart Hadfield and Tad Hogg ([arXiv:2012.04713](https://arxiv.org/abs/2012.04713))
- Performed extensive numerical simulations using HPC resources

**Research Aide, Argonne National Laboratory** **Summer 2018, 2019**

- Developed quantum-accelerated frameworks for network community detection and graph partitioning under the supervision of Yuri Alexeev
  - Co-authored 6 papers on quantum optimization and machine learning (5 first author)
  - Contributed to multiple proposals
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## Education

**Clemson University, SC** **Fall 2016 - Summer 2020**

PhD in Computer Science, advisor: Ilya Safro

**Master of Science in Computer Science en route to PhD** **Fall 2019**

Research in algorithms, high performance computing, big data analysis and quantum computing

Relevant coursework: Design & Analysis of Algorithms, Data Mining, Distributed & Cluster Computing, Parallel Architecture, Network Science

**Moscow Institute of Physics and Technology** **Fall 2012 - Summer 2016**

Department of Control and Applied Math,

**Bachelor of Science in Applied Mathematics and Physics**

Minor: Computer Science and Data Analysis

## Peer-reviewed Publications

Ruben S. Andrist, Martin J. A. Schuetz, Pierre Minssen, Romina Yalovetzky, Shouvanik Chakrabarti, Dylan Herman, Niraj Kumar, Grant Salton, **Ruslan Shaydulin**, Yue Sun, Marco Pistoia, Helmut G. Katzgraber. Hardness of the Maximum Independent Set Problem on Unit-Disk Graphs and Prospects for Quantum Speedups. *Phys. Rev. Research* 5, 043277 (2023). DOI: [10.1103/PhysRevResearch.5.043277](https://doi.org/10.1103/PhysRevResearch.5.043277)

Shree Hari Sureshababu\*, Dylan Herman\*, **Ruslan Shaydulin\***, Joao Basso, Shouvanik Chakrabarti, Yue Sun, Marco Pistoia. Parameter Setting in Quantum Approximate Optimization of Weighted Problems. *Quantum* 8, 1231 (2024). DOI: [10.22331/q-2024-01-18-1231](https://doi.org/10.22331/q-2024-01-18-1231)

Zichang He, **Ruslan Shaydulin**, Shouvanik Chakrabarti, Dylan Herman, Changhao Li, Yue Sun, Marco Pistoia. Alignment between Initial State and Mixer Improves QAOA Performance for Constrained Optimization. *npj Quantum Inf* 9, 121 (2023). DOI: [10.1038/s41534-023-00787-5](https://doi.org/10.1038/s41534-023-00787-5)

El Amine Cherrat, Snehal Raj, Iordanis Kerenidis, Abhishek Shekhar, Ben Wood, Jon Dee, Shouvanik Chakrabarti, Richard Chen, Dylan Herman, Shaohan Hu, Pierre Minssen, **Ruslan Shaydulin**, Yue Sun, Romina Yalovetzky, Marco Pistoia. Quantum Deep Hedging. *Quantum* 7, 1191 (2023). Preprint: [10.22331/q-2023-11-29-1191](https://arxiv.org/abs/10.22331/q-2023-11-29-1191)

Danylo Lykov, **Ruslan Shaydulin**, Yue Sun, Yuri Alexeev, Marco Pistoia. Fast Simulation of High-Depth QAOA Circuits. *IEEE/ACM Third International Workshop on Quantum Computing Software (QCS), (in conjunction with Supercomputing '23)*, 2023. DOI: [10.1145/3624062.3624216](https://doi.org/10.1145/3624062.3624216)

Dylan Herman\*, **Ruslan Shaydulin\***, Yue Sun\*, Shouvanik Chakrabarti, Shaohan Hu, Pierre Minssen, Arthur Rattew, Romina Yalovetzky, Marco Pistoia. Constrained Optimization via Quantum Zeno Dynamics. *Commun Phys* 6, 219, 2023. DOI: [10.1038/s42005-023-01331-9](https://doi.org/10.1038/s42005-023-01331-9)

**Ruslan Shaydulin**, Marco Pistoia. QAOA with  $N \cdot p \geq 200$ . 2023 *IEEE International Conference on Quantum Computing and Engineering (QCE) (to appear)*, 2023. Preprint: [arXiv:2303.02064](https://arxiv.org/abs/2303.02064)

Lucas Slattery, **Ruslan Shaydulin**, Shouvanik Chakrabarti, Marco Pistoia, Sami Khairy, Stefan M. Wild. Numerical evidence against advantage with quantum fidelity kernels on classical data. *Phys. Rev. A* 107, 062417, 2023. DOI: [10.1103/PhysRevA.107.062417](https://doi.org/10.1103/PhysRevA.107.062417)

Abdulkadir Canatar, Evan Peters, Cengiz Pehlevan, Stefan M. Wild, **Ruslan Shaydulin**. Bandwidth Enables Generalization in Quantum Kernel Models. *Transactions on Machine Learning Research*, 2023. Preprint: [arXiv:2206.06686](https://arxiv.org/abs/2206.06686)

Alvin Gonzales, **Ruslan Shaydulin**, Zain Saleem, Martin Suchara. Quantum Error Mitigation by Pauli Check Sandwiching. *Sci Rep* 13, 2122 (2023). DOI: [10.1038/s41598-023-28109-x](https://doi.org/10.1038/s41598-023-28109-x)

**Ruslan Shaydulin\***, Phillip C. Lotshaw\*, Jeffrey Larson, James Ostrowski, Travis S. Humble. Parameter Transfer for Quantum Approximate Optimization of Weighted MaxCut. *ACM Transactions on Quantum Computing* 4, 3, 19, 2023. DOI: [10.1145/3584706](https://doi.org/10.1145/3584706)

Tianyi Hao, **Ruslan Shaydulin**, Marco Pistoia, Jeffrey Larson. Exploiting In-Constraint Energy in Constrained Variational Quantum Optimization. In *Proceedings of the Third International Workshop on Quantum Computing Software (in conjunction with Supercomputing '22)*, 2022. DOI: [10.1109/QCS56647.2022.00017](https://doi.org/10.1109/QCS56647.2022.00017)

Kaiyan Shi, Rebekah Herrman, **Ruslan Shaydulin**, Shouvanik Chakrabarti, Marco Pistoia, Jeffrey Larson. Multi-Angle QAOA Does Not Always Need All Its Angles. *ACM/IEEE Workshop on Quantum Computing (in conjunction with The Seventh ACM/IEEE Symposium on Edge Computing)*. DOI: [10.1109/SEC54971.2022.00062](https://doi.org/10.1109/SEC54971.2022.00062)

Pradeep Niroula\*, **Ruslan Shaydulin\***, Romina Yalovetzky\*, Pierre Minssen, Dylan Herman, Shaohan Hu, Marco Pistoia. Constrained Quantum Optimization for Extractive Summarization on a Trapped-ion Quantum Computer. *Scientific Reports* 12, 17171 (2022). DOI: [10.1038/s41598-022-20853-w](https://doi.org/10.1038/s41598-022-20853-w)

**Ruslan Shaydulin**, Stefan Wild. Importance of Kernel Bandwidth in Quantum Machine Learning. *Phys. Rev. A* 106, 042407 (2022). DOI: [10.1103/PhysRevA.106.042407](https://doi.org/10.1103/PhysRevA.106.042407)

Xiaoyuan Liu, **Ruslan Shaydulin**, Ilya Safro. Quantum Approximate Optimization Algorithm with Sparsified Phase Operator. *2022 IEEE International Conference on Quantum Computing and Engineering (QCE)*, 2022 DOI: [10.1109/QCE53715.2022.00032](https://doi.org/10.1109/QCE53715.2022.00032)

Ashish Kakkar, Jeffrey Larson, Alexey Galda, **Ruslan Shaydulin**. Characterizing Error Mitigation by Symmetry Verification in QAOA. *2022 IEEE International Conference on Quantum Computing and Engineering (QCE)*, 2022 DOI: [10.1109/QCE53715.2022.00086](https://doi.org/10.1109/QCE53715.2022.00086)

Xiaoyuan Liu, Anthony Angone, **Ruslan Shaydulin**, Ilya Safro, Yuri Alexeev, Lukasz Cincio. Layer VQE: A Variational Approach for Combinatorial Optimization on Noisy Quantum Computers. *IEEE Transactions on Quantum Engineering*. DOI: [10.1109/TQE.2021.3140190](https://doi.org/10.1109/TQE.2021.3140190)

Sergey Bravyi, **Ruslan Shaydulin**, Shaohan Hu, Dmitri Maslov. Clifford Circuit Optimization with Templates and Symbolic Pauli Gates. *Quantum* 5, 580, 2021. DOI: [10.22331/q-2021-11-16-580](https://doi.org/10.22331/q-2021-11-16-580)

**Ruslan Shaydulin**, Stuart Hadfield, Tad Hogg, Ilya Safro. Classical symmetries and the Quantum Approximate Optimization Algorithm. *Quantum Inf Process* 20, 359, 2021. DOI: [10.1007/s11128-021-03298-4](https://doi.org/10.1007/s11128-021-03298-4)

**Ruslan Shaydulin**, Kunal Marwaha, Jonathan Wurtz, Phillip C. Lotshaw. QAOAKit: A Toolkit for Reproducible Study, Application, and Verification of the QAOA. In *Proceedings of the 2nd International Workshop on Quantum Computing Software (in conjunction with Supercomputing '21)*, 2021. DOI: [10.1109/QCS54837.2021.00011](https://doi.org/10.1109/QCS54837.2021.00011)

**Ruslan Shaydulin**, Alexey Galda. Error Mitigation for Deep Quantum Optimization Circuits by Leveraging Problem Symmetries. *2021 IEEE International Conference on Quantum Computing and Engineering (QCE)*, 2021. DOI: [10.1109/QCE52317.2021.00046](https://doi.org/10.1109/QCE52317.2021.00046)

**Ruslan Shaydulin**, Stefan M. Wild. Exploiting Symmetry Reduces the Cost of Training QAOA. *IEEE Transactions on Quantum Engineering*, 2021 DOI: [10.1109/TQE.2021.3066275](https://doi.org/10.1109/TQE.2021.3066275)

Zirou Qiu, **Ruslan Shaydulin**, Xiaoyuan Liu, Yuri Alexeev, Christopher S. Henry, Ilya Safro. ELRUNA: Elimination Rule-based Network Alignment. *ACM Journal of Experimental Algorithmics*, 2021. DOI: [10.1145/3450703](https://doi.org/10.1145/3450703)

Hayato Ushijima-Mwesigwa\*, **Ruslan Shaydulin\***, Christian F. A. Negre, Susan Mniszewski, Yuri Alexeev, Ilya Safro. Multilevel Combinatorial Optimization Across Quantum Architectures. *ACM Transactions on Quantum Computing*, 2020. DOI: [10.1145/3425607](https://doi.org/10.1145/3425607)

Justin Sybrandt, **Ruslan Shaydulin**, Ilya Safro. Hypergraph Partitioning With Embeddings. In *IEEE Transactions on Knowledge and Data Engineering*, 2020. DOI: [10.1109/TKDE.2020.3017120](https://doi.org/10.1109/TKDE.2020.3017120)

**Ruslan Shaydulin**, Caleb Thomas, Paige Rodeghero. Making Quantum Computing Open: Lessons from Open-Source Projects. In *Proceedings of First International Workshop on Quantum Software Engineering (Q-SE 2020) (co-located with ICSEW 2020)*. DOI: [10.1145/3387940.3391471](https://doi.org/10.1145/3387940.3391471)

Sami Khairy, **Ruslan Shaydulin**, Lukasz Cincio, Yuri Alexeev, Prasanna Balaprakash. Learning to Optimize Variational Quantum Circuits to Solve Combinatorial Problems. In *Proceedings of Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20)*, 2020. **Acceptance rate: 20.6%**  
DOI: [10.1609/aaai.v34i03.5616](https://doi.org/10.1609/aaai.v34i03.5616)

Sami Khairy, **Ruslan Shaydulin**, Lukasz Cincio, Yuri Alexeev, Prasanna Balaprakash. Reinforcement-Learning-Based Variational Quantum Circuits Optimization for Combinatorial Problems. In *Proceedings of the Machine Learning and the Physical Sciences workshop at Conference on Neural Information Processing Systems (NeurIPS 2019)*, 2019. ([link](#))  
Preprint: [arXiv:1911.04574](https://arxiv.org/abs/1911.04574)

**Ruslan Shaydulin**, Yuri Alexeev. Evaluating Quantum Approximate Optimization Algorithm: A Case Study. In *Proceedings of the 2nd International Workshop on Quantum Computing for Sustainable Computing (QCSC 2019) (in conjunction with 10th International Green and Sustainable Computing Conference (IGSC 2019))*, 2019  
DOI: [10.1109/IGSC48788.2019.8957201](https://doi.org/10.1109/IGSC48788.2019.8957201)

Sami Khairy, **Ruslan Shaydulin**, Lukasz Cincio, Yuri Alexeev, Prasanna Balaprakash. Reinforcement Learning for Quantum Approximate Optimization. *Research Poster, Supercomputing '19*, 2019 ([available in Proceedings](#))

**Ruslan Shaydulin**, Ilya Safro, and Jeffrey Larson. Multistart Methods for Quantum Approximate Optimization. In *Proceedings of 2019 IEEE High Performance Extreme Computing Conference (HPEC)*, 2019  
**Best Student Paper** (of ~50 student papers). DOI: [10.1109/HPEC.2019.8916288](https://doi.org/10.1109/HPEC.2019.8916288)

**Ruslan Shaydulin**, Hayato Ushijima-Mwesigwa, Christian F.A. Negre, Ilya Safro, Susan M Mniszewski, and Yuri Alexeev. A Hybrid Approach for Solving Optimization Problems on Small Quantum Computers. *Computer*, 52(6):18-26, 2019.  
**Cover Feature**. DOI: [10.1109/MC.2019.2908942](https://doi.org/10.1109/MC.2019.2908942)

**Ruslan Shaydulin**, Hayato Ushijima-Mwesigwa, Ilya Safro, Susan Mniszewski, and Yuri Alexeev. Network Community Detection on Small Quantum Computers. *Advanced Quantum Technologies*, 2(9):1900029, 2019.  
DOI: [10.1002/qute.201900029](https://doi.org/10.1002/qute.201900029)

**Ruslan Shaydulin**, Hayato Ushijima-Mwesigwa, Ilya Safro, Susan Mniszewski, and Yuri Alexeev. Community Detection Across Emerging Quantum Architectures. In *Proceedings of the 3rd International Workshop on Post Moore's Era Supercomputing (in conjunction with Supercomputing '18)*, 12-14, 2018. Preprint [arXiv:1810.07765](https://arxiv.org/abs/1810.07765)

**Ruslan Shaydulin** and Ilya Safro. Aggregative Coarsening for Multilevel Hypergraph Partitioning. In *Proceedings of 17th International Symposium on Experimental Algorithms (SEA 2018)*, 103:2:1-2:15, 2018. DOI: [10.4230/LIPIcs.SEA.2018.2](https://doi.org/10.4230/LIPIcs.SEA.2018.2)

**Ruslan Shaydulin**, Jie Chen, and Ilya Safro. Relaxation-Based Coarsening for Multilevel Hypergraph Partitioning. *Multiscale Modeling & Simulation*, 17(1):482-506, 2019. DOI: [10.1137/17M1152735](https://doi.org/10.1137/17M1152735)

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## Invited Articles and White Papers

**Ruslan Shaydulin**, Michael A. Perlin, Ciaran Ryan-Anderson, Shouvanik Chakrabarti, Marco Pistoia. Focus beyond Surface Code for Error-Corrected Quantum Advantage. *ASCR Workshop on Basic Research Needs in Quantum Computing and Networking White Paper*, 2023

**Ruslan Shaydulin**, Martin Suchara and Jeffrey Larson. Standardized low-level noise characterization to differentiate DOE quantum testbeds. *Quantum Computing Testbeds Stakeholder Workshop White Paper*, 2021

Yuri Alexeev, Jeffrey Larson, Sven Leyffer, and **Ruslan Shaydulin**. Solving Combinatorial Optimization Problems on Quantum Computers. In *SIAM News Vol. 53 #6 July/August 2020*

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## Online Preprints and In-Submission Works

Michael A. Perlin, **Ruslan Shaydulin**, Benjamin P. Hall, Pierre Minssen, Changhao Li, Kabir Dubey, Rich Rines, Eric R. Anschuetz, Marco Pistoia, Pranav Gokhale. Q-CHOP: Quantum constrained Hamiltonian optimization. *In submission*. Preprint: [arXiv:2403.05653](https://arxiv.org/abs/2403.05653)

Changhao Li, Boning Li, Omar Amer, **Ruslan Shaydulin**, Shouvanik Chakrabarti, Guoqing Wang, Haowei Xu, Hao Tang, Isidor Schoch, Niraj Kumar, Charles Lim, Ju Li, Paola Cappellaro, Marco Pistoia. Blind quantum machine learning with quantum bipartite correlator. *In submission*. Preprint: [arXiv:2310.12893](https://arxiv.org/abs/2310.12893)

**Ruslan Shaydulin**<sup>\*</sup>, Changhao Li, Shouvanik Chakrabarti, Matthew DeCross, Dylan Herman, Niraj Kumar, Jeffrey Larson, Danylo Lykov, Pierre Minssen, Yue Sun, Yuri Alexeev, Joan M. Dreiling, John P. Gaebler, Thomas M. Gatterman, Justin A. Gerber, Kevin Gilmore, Dan Gresh, Nathan Hewitt, Chandler V. Horst, Shaohan Hu, Jacob Johansen, Mitchell Matheny, Tanner Mengle, Michael Mills, Steven A. Moses, Brian Neyenhuis, Peter Siegfried, Romina Yalovetzky, Marco Pistoia. Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem. *In submission*. Preprint: [arXiv:2308.02342](https://arxiv.org/abs/2308.02342)

**Ruslan Shaydulin**, Justin Sybrandt. To Agile, or not to Agile: A Comparison of Software Development Methodologies. Preprint: [arXiv:1704.07469](https://arxiv.org/abs/1704.07469)

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## Patents

Sergey Bravyi, Shaohan Hu, Dmitri Maslov, **Ruslan Shaydulin**. Partitioned template matching and symbolic peephole optimization. *Pending*. Patent application [US20220129411A1](https://patents.google.com/patent/US20220129411A1)

## Contributed Talks and Posters

- American Physical Society March Meeting '24** *Minneapolis, MN* **Mar 6, 2024**  
Gave a talk "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- Triangle Quantum Computing Seminar** *NC State University* **Feb 9, 2024**  
Gave a talk "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- Quantum Computing in Finance** *Abu Dhabi, UAU* **Jan 24, 2024**  
Gave a talk "Quantum Computing and Quantum Communications in the Financial Industry."
- Quantum Information Processing '24** *Taipei, ROC* **Jan 15, 2024**  
Presented a poster "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- Quantum Computing Seminar** *Lawrence Berkeley National Laboratory* **Dec 8, 2023**  
Gave a talk "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- Q2B 2023 Silicon Valley** *Santa Clara, CA* **Dec 7, 2023**  
Gave a talk "Optimizing ETF Arbitrage via the Quantum Constrained Hamiltonian Optimization algorithm."
- Q2B 2023 Silicon Valley** *Santa Clara, CA* **Dec 5, 2023**  
Gave a talk "Quantum Computing and Quantum Communications in the Financial Industry."
- Seminar** *Institute for Pure and Applied Mathematics (IPAM), UCLA* **Oct 9, 2023**  
Gave a talk "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- IEEE Quantum Week 2023** *Bellevue, WA* **Sep 22, 2023**  
Gave a talk "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- Gene Golub SIAM Summer School on Quantum Computing and Optimization** *Lehigh University* **Aug 10, 2023**  
Gave a talk "Evidence of Scaling Advantage for the Quantum Approximate Optimization Algorithm on a Classically Intractable Problem."
- ASCR Workshop on Basic Research Needs in Quantum Computing and Networking** **Jul 13, 2023**  
Gave a lightning talk on viewpoints from industry.
- Quantum Computing Tutorial** *Argonne National Laboratory* **Jun 26, 2023**  
Led a tutorial on Quantum Approximate Optimization Algorithm.
- QuCS lecture series** *University of Notre Dame* **Jun 8, 2023**  
Gave a talk "Parameter Setting in Quantum Approximate Optimization of Weighted Problems"

- Quantum Computing Seminar** *Lawrence Berkeley National Laboratory* **Jun 6, 2023**  
Gave a talk "Parameter Setting in Quantum Approximate Optimization of Weighted Problems"
- SIAM Conference on Optimization (OP23)** **May 31, 2023**  
Gave a talk "Parameter Setting in Quantum Approximate Optimization of Weighted Problems"
- Quantum Machine Learning Seminar** *National University of Singapore* **Apr 25, 2023**  
Gave a talk "Generalization of Quantum Kernel Methods"
- American Physical Society March Meeting '23** *Las Vegas, NV* **Mar 6, 2023**  
Gave a talk "Generalization of Quantum Kernel Methods"
- Quantum Information Processing '23** *Ghent, Belgium* **Feb 7, 2023**  
Presented posters on recent quantum algorithm advances at JPMorgan Chase
- INFORMS Annual Meeting '22** *Indianapolis, IN* **Oct 17, 2022**  
Gave an invited talk "Portfolio Optimization via Quantum Zeno Dynamics on a Quantum Processor".
- Workshop on Quantum Computing and Operations Research** *Fields Institute* **Oct 14, 2022**  
Gave an invited talk "[Quantum optimization of financial problems](#)".
- Chicago Quantum Exchange Seminar** *University of Chicago* **Sep 29, 2022**  
Gave an invited talk "Solving Constrained Optimization Problems on Quantum Computers".
- Quantum Computing Tutorial** *Argonne National Laboratory* **Jun 15, 2022**  
Led a tutorial on Quantum Approximate Optimization Algorithm.
- Southeast Quantum Computing Workshop** *University of Georgia* **May 20, 2022**  
Gave an invited talk "Importance of Kernel Bandwidth in Quantum Machine Learning."
- American Physical Society March Meeting '22** *Chicago, IL* **Mar 17, 2022**  
Gave a talk "Importance of Kernel Bandwidth in Quantum Machine Learning."
- Quantum Information Processing '22** *Pasadena, CA* **Mar 8, 2022**  
Presented a poster "Importance of Kernel Bandwidth in Quantum Machine Learning."
- DOE Quantum Computing Testbeds Stakeholder Workshop** **Dec 2, 2021**  
Gave a talk "Standardized Low-Level Noise Characterization to Differentiate DOE Quantum Testbeds"
- Supercomputing '21 (International Workshop on Quantum Computing Software)** **Nov 15, 2021**  
Gave a talk "QAOAKit: A Toolkit for Reproducible Study, Application, and Verification of the QAOA"
- IEEE Quantum Week 2021** **Oct 17-22, 2021**  
Gave talks "Classical Symmetries and QAOA" and "Error Mitigation for Deep Quantum Optimization Circuits by Leveraging Problem Symmetries"



- QIC seminar** *University of Delaware* **Sep 29, 2021**  
Gave a talk "Towards Practical Advantage in Quantum Optimization"
- SIAM Conference on Optimization (OP21)** **Jul 21, 2021**  
Gave a talk "[Classical Symmetries and QAOA](#)"
- Quantum Computing Tutorial** *Argonne National Laboratory* **Jun 16, 2021**  
Led a tutorial on Quantum Approximate Optimization Algorithm.
- HPC-AI colloquium** *Intel* **Jun 8, 2021**  
Gave a talk "Towards Practical Advantage in Quantum Optimization"
- CM/QIS seminar** *Virginia Tech* **Apr 19, 2021**  
Gave talk "Classical Symmetries and QAOA"
- Chicago Quantum Exchange Member and Partner Workshop** **Apr 19, 2021**  
Gave talk "Quantum Optimization: the Next Five Years"
- Sixth International Conference for Young Quantum Information Scientists (YQIS 2021)** **Apr 12, 2021**  
Gave talk "Classical Symmetries and QAOA"
- LANS Seminar** *Argonne National Laboratory* **Mar 24, 2021**  
Gave talk "Classical Symmetries and QAOA"
- APS March Meeting** **Mar 17, 2021**  
Gave talk "Classical Symmetries and QAOA"
- INFORMS Annual Meeting '20** **Nov 13, 2020**  
Gave talk "Classical Symmetries and the Quantum Approximate Optimization Algorithm"
- Quantum Computing Seminar** *IBM Research* **Sep 24, 2020**  
Gave talk "Practical Optimization on Near-term Quantum Computers"
- Quantum Computing Tutorial** *Argonne National Laboratory* **Jun 15, 2020**  
Led [a tutorial on Quantum Approximate Optimization Algorithm](#).
- SIAM Conference on Parallel Processing for Scientific Computing (PP20)** *Seattle, WA* **Feb 13, 2020**  
Gave talk "Multilevel Hybrid Quantum-Classical Algorithms on Graphs"
- Information Science and Technology Institute Seminar** *Los Alamos National Laboratory* **Nov 26, 2019**  
Gave talk "Practical Optimization on Near-term Quantum Computers"
- Supercomputing '19** *Denver, CO* **Nov 17-22, 2019**  
Gave talk "Hybrid Quantum-Classical Algorithms for Graph Problems: Forging a Path to Near-Term Applications" at the [Clemson booth](#) and at the [SC Theater](#)



<b>Mathematics and Computer Science Seminar</b> <i>Argonne National Laboratory</i> Gave talk "Practical Optimization on Near-term Quantum Computers"	<b>Nov 15, 2019</b>
<b>Quantum Computing Seminar</b> <i>Oak Ridge National Laboratory</i> Gave talk "Practical Optimization on Near-term Quantum Computers"	<b>Nov 4, 2019</b>
<b>International Green and Sustainable Computing Conference (IGSC 2019)</b> <i>Alexandria, VA</i> Presented poster "Reinforcement Learning for Quantum Approximate Optimization"	<b>Oct 22, 2019</b>
<b>Chicago Quantum Exchange Meeting</b> <i>University of Chicago</i> Presented poster "Practical Quantum Approximate Optimization"	<b>June 12, 2019</b>
<b>SIAM Conference on Computational Science and Engineering (CSE19)</b> <i>Spokane, WA</i> Presented poster " <a href="#">Quantum Local Search for Graph Community Detection</a> "	<b>Feb 25-28, 2019</b>
<b>Quantum Computing Tutorial</b> <i>Argonne National Laboratory</i> Gave talk " <a href="#">QAOA Algorithm Introduction</a> "	<b>Dec 10-11, 2018</b>
<b>Supercomputing '18</b> <i>Dallas, TX</i> Gave talk "Community Detection Across Emerging Quantum Architectures" at Clemson booth	<b>Nov 11-16, 2018</b>
<b>Quantum Computing Workshop</b> <i>Argonne National Laboratory</i> Presented preliminary results on " <a href="#">Machine Learning on Near-Term Quantum Computers</a> "	<b>Jul 25-27, 2018</b>
<b>32nd Clemson Mini-Conference on Discrete Mathematics and Algorithms</b> <i>Clemson University</i> Presented poster "Relaxation-Based Coarsening for Multilevel Hypergraph Partitioning"	<b>Nov 4, 2017</b>
<b>58th Scientific Conference</b> <i>Moscow Institute of Physics and Technology</i> Gave talk "IPC (Inter-Process Communication) in OS X"	<b>Nov 23-28, 2015</b>

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## Leadership and Service

### Requested Proposal Reviewer

- National Science Foundation (2023, 2024)

### Requested Reviewer (peer review)

- Nature Communications (2023)
- IOP Quantum Science and Technology (2022)
- Springer Quantum Information Processing (2022)
- [Quantum](#) journal (2020, 2021, 2022, 2023)
- npj Quantum Information (2020, 2023)
- IEEE Transactions on Computers (2020)
- IEEE Transactions on Quantum Engineering (2020, 2021, 2022)
- IOP New Journal of Physics (2021, 2023)
- ACM Journal of Experimental Algorithmics (2021)
- ACM Transactions on Quantum Computing (2023)

## Program Committee Member

- IEEE International Conference on Quantum Computing and Engineering ([QCE21](#), QCE22, QCE23, QCE24)
- The Third International Workshop on Quantum Resource Estimation ([QRE 2021](#))

## IEEE Quantum Week 2022

Co-organized a workshop on [Quantum Algorithms for Financial Applications](#)

Sep 22, 2023

## IEEE Quantum Week 2023

Session chair

Sep 20, 2023

## American Physical Society March Meeting '23 *Las Vegas, NV*

Session chair

Mar 9, 2023

## IEEE Quantum Week 2022

Co-organized a workshop on [Quantum Algorithms for Financial Applications](#)

Sep 23, 2022

## INFORMS Annual Meeting

Led and co-organized a tutorial "Combinatorial Optimization on Quantum Computers" and a workshop "The Future of Quantum Optimization"

Oct 25, 2021

## IEEE Quantum Week 2021

Session chair

Oct 19, 2021

## Afro-Academic, Cultural, Technological and Scientific Olympics (ACT-SO)

Mentored a high-school student

2021-22

## SIAM Conference on Optimization (OP21)

Co-organized a minisymposium "[Quantum Discrete Optimization](#)"

Jul 20-23, 2021

## Chicago Quantum Exchange

Co-organized a workshop "[Quantum Feature Maps for the NISQ Era](#)"

Apr 16, 2021

## IEEE Quantum Week

Led and co-organized a minitutorial "[Combinatorial Optimization on Quantum Computers](#)"

Oct 15, 2020

## SIAM Conference on Parallel Processing for Scientific Computing (PP20) *Seattle, WA*

Led and co-organized a minitutorial "[Combinatorial Optimization on Quantum Computers](#)"

Feb 12-15, 2020

## SIAM Conference on Parallel Processing for Scientific Computing (PP20) *Seattle, WA*

Co-organized a minisymposium "Recent Advances and Trends in Hybrid Quantum-Classical Algorithms"

Feb 12-15, 2020

## Supercomputing '19 *Denver, CO*

Student volunteer, run tutorials, technical program session and Birds-of-Feather

Nov 17-22, 2019

## Quantum Computing Tutorial *Argonne National Laboratory*

Led and co-organized a [hands-on tutorial for Qiskit, a framework for quantum computing](#)

May 14, 2019

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# Ruslan Shaydulin

[shaydul.in](http://shaydul.in)

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**Mathematics Teacher, Summer School** *Kostroma, Russia*  
School administrator, organized extracurricular activities.

**Summer 2014**

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## Teaching

**Gene Golub SIAM Summer School on Quantum Computing and Optimization** *Lehigh University*

**Aug 10, 2023**

Taught a two-day mini-course on quantum algorithms for optimization

**Network Science CPSC 8480** *Clemson University*

**Fall 2018, 2019**

Teaching Assistant responsible for grading and answering students' questions during office hours

**Design and Analysis of Algorithms CPSC 8400** *Clemson University*

**Spring 2019**

Teaching Assistant responsible for grading and answering students' questions during office hours

**Algorithms and Data Structures CPSC 2120** *Clemson University*

**Spring 2019**

Teaching Assistant responsible for running the lab section, grading and answering students' questions during office hours

**Mathematics Teacher, Summer School** *Kostroma, Russia*

**Summer 2014**

Created and taught a course on basics of graph theory, combinatorics and number theory to middle and high school students.

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## Honors and Awards

- Outstanding Young Engineer Award for the year 2021, awarded by IEEE Chicago Section
- Best Student Paper at IEEE HPEC 2019 (of ~50 student papers), *recipient*
- IBM Teach-the-Qiskit-Teacher training program, *selected to represent Argonne National Laboratory*
- Moscow Institute of Physics and Technology Abramov scholarship - Top 300 students in the university, based on high academic achievement, *recipients*