

# CURRICULUM VITAE

## Sevag Gharibian

*Professor (W2)*

Department of Computer Science  
Institute for Photonic Quantum Systems  
Paderborn University, 33098 Paderborn, Germany

Email: [sevag.gharibian@upb.de](mailto:sevag.gharibian@upb.de)

Web: [groups.uni-paderborn.de/fg-qi/index.html](http://groups.uni-paderborn.de/fg-qi/index.html)



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## RESEARCH INTERESTS

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### *Theoretical computer science*

- Algorithms: Exact algorithms, approximation algorithms, quantum algorithms
- Complexity theory: Quantum complexity theory, proof systems, constraint satisfaction

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## EMPLOYMENT

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Professor (W2) Department of Computer Science, Paderborn University (UPB), Germany	2021 – present
Junior Professor (W1) Department of Computer Science, Paderborn University (UPB), Germany	2018 – 2021
Assistant Professor Department of Computer Science, Virginia Commonwealth University (VCU), USA	2014 – 2018
Simons Postdoctoral Fellow Simons Institute for the Theory of Computing, University of California, Berkeley, USA Adviser: Dr. Umesh Vazirani	Jan – May 2014
NSERC Banting Postdoctoral Fellow Computer Science Division, University of California, Berkeley, USA Adviser: Dr. Umesh Vazirani	2013 – 2014
Visiting Lecturer Department of Computer Science, University of Illinois (UIC), Chicago, USA	Aug – Dec 2012
Research and Teaching Assistant Department of Computer Science, University of Waterloo, Canada	2006 – 2012
Software developer Embarcadero Technologies, Toronto, Canada Developed database management software using C++, Java, SQL	2005 – 2006
Software developer Positions with 5 software companies as co-op student (see Industry Experience)	2001 – 2004

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**EDUCATION**

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- Ph.D. in Computer Science, University of Waterloo, Canada 2008 – 2012  
Thesis: “Approximation, proof systems, and correlations in a quantum world”  
Supervisor: Dr. Richard Cleve
- Master of Mathematics, University of Waterloo, Canada 2006 – 2008  
Thesis: “On the hardness of the quantum separability problem and the global power of locally invariant unitary operations”  
Supervisor: Dr. Richard Cleve
- Bachelor of Computer Science, Co-op, University of Waterloo, Canada 2000 – 2005

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**GRANTS**

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**Total grant funding:** 1,128,832 EUR

**Grants awarded:**

- Deutsche Forschungsgemeinschaft (DFG) – 450041824 2021 – 2024  
Title: “Characterizing the complexity of physical quantum problems with oracle complexity classes”  
Role: Single PI  
Amount: 283,490 EUR
- Deutsche Forschungsgemeinschaft (DFG) – 432788384 2020 – 2023  
Title: “The Quantum Satisfiability Problem: Algorithms & Complexity-Theoretic Hardness”  
Role: Single PI  
Amount: 273,790 EUR
- U.S. Department of Energy (DOE) 2017 – 2018  
Title: “Quantum Algorithms from the Interplay of Simulation, Optimization, and Machine Learning”  
Role: Lead PI at VCU (multi-institution grant, led by PI O. Parekh at Sandia Labs)  
Amount: 4,500,000 USD total (my share: 36,389 USD)
- National Science Foundation (NSF) CCF-1745134 2017 – 2018  
Title: “QIP 2018 Student and Postdoctoral Fellow Travel Funding Support”  
Role: Single PI  
Amount: 10,000 USD
- National Science Foundation (NSF) CCF-1617710 2016 – 2019  
Title: “AF: Small: Approximation algorithms for quantum mechanical problems.”  
Role: Single PI  
Amount: 380,754 USD

- National Science Foundation (NSF) CCF-1526189 2015 – 2018  
 Title: “AF: Small: Exact algorithms for the quantum satisfiability problem.”  
 Role: Single PI  
 Amount: 196,593 USD
- Dean’s Undergraduate Research Initiative, VCU School of Engineering 2015  
 Role: Single PI  
 Details: 5000 USD. Funding for undergrad research assistant, Aidan Collins.

## **FELLOWSHIPS AND SCHOLARSHIPS**

**Total fellowship/scholarship funding (Undergrad, Grad, Postdoc):** 414,500 CAD (283,667 EUR)

### **Fellowships/scholarships awarded:**

- NSERC Banting Postdoctoral Fellowship 2013 – 2015  
 Details: 140,000 CAD. NSERC’s top postdoctoral fellowship. Only 23 awarded annually, 6 of which can be taken up outside of Canada (as in my case).
- NSERC Postdoctoral Fellowship, 80,000 CAD, declined 2013 – 2015
- NSERC CGS Michael Smith Foreign Study Supplement, 6000 CAD 2010 – 2011
- European Union-Canada Exchange Scholarship, 10,000 CAD 2010 – 2011
- NSERC Alexander Graham Bell Canada Graduate Scholarship, 70,000 CAD 2010 – 2012
- President’s Graduate Scholarship, University of Waterloo, 20,000 CAD 2010 – 2012
- Ontario Graduate Scholarship, 30,000 CAD, declined 2010 – 2012
- David R. Cheriton Graduate Scholarship, 40,000 CAD 2009 – 2011
- Graduate Entrance Scholarship, University of Waterloo, 4000 CAD 2006
- Ontario Graduate Scholarship in Science and Technology, 10,000 CAD 2006 – 2007
- Tro Najarian Memorial Scholarship, Armenian Relief Society, 500 CAD 2005
- Cognos Scholarship, Cognos Inc., 4000 CAD 2001 – 2002

## **AWARDS/DISTINCTIONS**

- Good Practices Digital Teaching Distinction 2020  
 Details: Via faculty or student nomination for excellent online course delivery practices
- Undergraduate Research Opportunities Faculty Mentor Award, VCU 2017  
 Details: Awarded for undergraduate research mentoring, based on student nominations

- Student Choice Award for Computer Science Faculty of the Year, VCU 2017  
Details: Awarded by Engineering Student Council, based on votes from student body
- Teaching Excellence Award, Department of Computer Science, VCU 2016, 2017
- Achievement Award, Institute for Quantum Computing, University of Waterloo 2012  
Details: 5000 CAD. Awarded for “exceptional achievement in research”.
- Best Poster Award, 14<sup>th</sup> Workshop on Quantum Information Processing (QIP) 2011  
Details: Awarded for the “founding of a new research area”, as stated by award committee.
- 2<sup>nd</sup> Place for Best Speaker, 5<sup>th</sup> Canadian Quantum Information Students' Conference, 2008  
Université de Montréal, Canada

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## RESEARCH

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**Statistics (Google Scholar, November 18, 2021):** Citations: 1116, h-index: 14, i10-index: 16.

### Preprints

1. S. Gharibian, F. Le Gall. Dequantizing the Quantum Singular Value Transformation: Hardness and applications to quantum chemistry and the quantum PCP conjecture. arXiv:2111.09079, 2021.
2. J. D. Watson, J. Bausch, S. Gharibian. The complexity of translationally invariant problems beyond ground state energies. arXiv:2012.12717, 2020.

### Peer-Reviewed Journal Publications (in reverse chronological order)

1. A. Broadbent, S. Gharibian and H.-S. Zhou. Towards quantum one-time memories from stateless hardware. *Quantum*, 5:429, 2021.
2. M. Aldi, N. de Beaudrap, S. Gharibian and S. Saedi. On efficiently solvable cases of Quantum k-SAT. *Communications in Mathematical Physics*, 381:209-256, 2021. (Open access version published at doi.org/10.1007/s00220-020-03843-9, 2020.)
3. S. Gharibian and J. Yirka. The complexity of simulating local measurements on quantum systems. *Quantum*, 3:189, 2019.
4. S. Gharibian, J. Sikora. Ground state connectivity of local Hamiltonians. *ACM Transactions on Computation Theory*, 10 (2), 2018.
5. S. Gharibian, Y. Huang, Z. Landau, S. W. Shin. Quantum Hamiltonian Complexity. *Foundations and Trends in Theoretical Computer Science*, 10 (3):159-282, 2015.
6. S. Gharibian, Z. Landau, S. W. Shin, and G. Wang. Tensor network non-zero testing. *Quantum Information & Computation* 15 (9 & 10):885-899, 2015.

7. S. Gharibian and J. Kempe. Hardness of approximation for quantum problems. *Quantum Information & Computation* 14 (5 & 6): 517-540, 2014.
8. D. Berry, R. Cleve and S. Gharibian. Gate-efficient discrete simulations of continuous-time quantum query algorithms. *Quantum Information & Computation* 14 (1 & 2): 1-30, 2014.
9. S. Gharibian, J. Sikora, and S. Upadhyay. QMA variants with polynomially many provers. *Quantum Information & Computation* 13(1 & 2):0135-0157, 2013.
10. S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. *SIAM Journal on Computing* 41(4): 1028-1050, 2012.
11. S. Gharibian. Quantifying non-classicality with local unitary operations. *Physical Review A* 86:042106, 2012.
12. M. Piani, S. Gharibian, G. Adesso, J. Calsamiglia, P. Horodecki and A. Winter. All non-classical correlations can be activated into distillable entanglement. *Physical Review Letters* 106: 220403, 2011.
13. S. Gharibian, M. Piani, G. Adesso, J. Calsamiglia, P. Horodecki. Characterizing quantumness via entanglement creation. *International Journal of Quantum Information* 9(7 & 8):1701-1713, 2011.
14. S. Gharibian. Strong NP-hardness of the quantum separability problem. *Quantum Information & Computation* 10(3 & 4): 343-360, 2010.
15. S. Gharibian, H. Kampermann, and D. Bruß. On global effects caused by locally noneffective unitary operations. *Quantum Information & Computation* 9(11 & 12): 1013-1029, 2009.
16. A. Datta and S. Gharibian. Signatures of non-classicality in mixed-state quantum computation. *Physical Review A* 79:042325, 2009.

#### **Peer-Reviewed Conference Proceedings (in reverse chronological order)**

1. S. Gharibian and D. Rudolph. On polynomially many queries to NP or QMA oracles. To appear in *Proceedings of the 13<sup>th</sup> Innovations in Theoretical Computer Science (ITCS)*, 2022. Preprint at arXiv:2111.02296.
2. A. Broadbent, S. Gharibian and H.-S. Zhou. Towards quantum one-time memories from stateless hardware. *Proceedings of the 15th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC)*, volume 158 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 6:1-6:25, 2020.
3. S. Gharibian, S. Piddock and J. Yirka. Oracle complexity classes and local measurements on physical Hamiltonians. *Proceedings of the 37<sup>th</sup> Symposium on Theoretical Aspects of Computer Science (STACS)*, volume 154 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 20:1-20:37, 2020.
4. S. Gharibian and O. Parekh. Almost optimal classical approximation algorithms for a quantum generalization of Max-Cut. *Proceedings of the 22<sup>nd</sup> International Workshop on Approximation*

- Algorithms for Combinatorial Optimization Problems (APPROX)*, volume 145 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 31:1-31:17, 2019.
5. S. Gharibian, M. Santha, J. Sikora, A. Sundaram and J. Yirka. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). *Proceedings of 43<sup>rd</sup> International Symposium on Mathematical Foundations of Computer Science (MFCS)*, volume 117 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 58:1-58:16, 2018.
  6. M. Aldi, N. de Beaudrap, S. Gharibian and S. Saedi. On efficiently solvable cases of Quantum k-SAT. *Proceedings of 43<sup>rd</sup> International Symposium on Mathematical Foundations of Computer Science (MFCS)*, volume 117 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 38:1-38:16, 2018.
  7. S. Gharibian and J. Yirka. The complexity of simulating local measurements on quantum systems. *Proceedings of the 12th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2017)*, volume 73 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 2:1-2:17, 2018.
  8. N. de Beaudrap and S. Gharibian. A linear time algorithm for quantum 2-SAT. *Proceedings of the 31<sup>st</sup> Conference on Computational Complexity (CCC)*, volume 50 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 27:1-27:21, 2016.
  9. S. Gharibian, J. Sikora. Ground state connectivity of local Hamiltonians. *Proceedings of the 42<sup>nd</sup> International Colloquium on Automata, Languages and Programming (ICALP)*, volume 9134 of *Lecture Notes in Computer Science*, pages 617 – 628, 2015.
  10. S. Gharibian and J. Kempe. Hardness of approximation for quantum problems. *Proceedings of the 39<sup>th</sup> International Colloquium on Automata, Languages and Programming (ICALP)*, pages 387-398, Springer, 2012.
  11. S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. *Proceedings of the 26<sup>th</sup> IEEE Conference on Computational Complexity (CCC)*, 178-188, 2011.
  12. D. Bruß, S. Gharibian, and H. Kampermann. Revealing quantum entanglement via locally noneffective operations. *Proceedings of 3rd International Symposium on Quantum Interaction (QI)*, pages 3-5, Springer, 2009.

### **Invited Talks (in reverse chronological order)**

1. S. Gharibian. Educating the Future Quantum Information Workforce: The Pedagogy of Quantum Technologies Workshop, Quantum Initiative, University of South Florida, USA, 2021.
2. S. Gharibian. What might a quantum computer be good for? 2021 German-American Frontiers of Engineering Symposium, Oak Ridge National Laboratory, USA, 2021.
3. J. D. Watson, J. Bausch, S. Gharibian. The complexity of translationally invariant problems beyond ground state energies. Quantum Software and Optimisation online workshop, Chalmers University of Technology, Sweden, 2021.

4. S. Gharibian. An introduction to Quantum Complexity Theory. Dagstuhl Seminar 20385, “Algebraic and Other Aspects of Complexity Theory”. Schloss Dagstuhl, Germany, 2020.
5. S. Gharibian. The Quantum Approximate Optimization Algorithm. Mini-Workshop on Mixers for QAOA, Chalmers University of Technology, Sweden, 2020.
6. S. Gharibian, M. Santha, J. Sikora, A. Sundaram and J. Yirka. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). Quantum Innovators Workshop, Institute for Quantum Computing, University of Waterloo, Canada, 2018. Presented by A. Sundaram.
7. M. Aldi, N. de Beaudrap, S. Gharibian and S. Saeeedi. On efficiently solvable cases of Quantum k-SAT. Dagstuhl Seminar 18391, “Algebraic Methods in Computational Complexity”. Schloss Dagstuhl, Germany, 2018.
8. A. Broadbent, S. Gharibian, and H.-S. Zhou. Towards quantum one-time memories from stateless hardware. 18<sup>th</sup> Asian Quantum Information Science Conference (AQIS 2018) Satellite Workshop on Quantum Computing, Kyoto University, Japan, 2018.
9. (Declined due to scheduling conflicts) A. Broadbent, S. Gharibian, and H.-S. Zhou. Towards quantum one-time memories from stateless hardware. Trustworthy Quantum Information Workshop (TQI), Shanghai, China, 2016
10. S. Gharibian, Y.-K. Liu. Classical approximation algorithms for quantum constraint satisfaction problems. SIAM Conference on Optimization, Vancouver, Canada, 2017.
11. S. Gharibian, Y.-K. Liu. Classical approximation algorithms for quantum constraint satisfaction problems. Canadian Mathematical Society (CMS) Winter Meeting, Canada, 2016.
12. S. Gharibian, Y.-K. Liu. Classical approximation algorithms for quantum constraint satisfaction problems. Semidefinite and Matrix Methods for Optimization and Communication, National University of Singapore, Singapore, 2016.
13. S. Gharibian, J. Sikora. Ground state connectivity of local Hamiltonians. Workshop around BQP, Tokyo Institute of Technology (Tamachi Campus), Japan, 2015. Presented by J. Sikora.
14. S. Gharibian, J. Sikora. Ground state connectivity of local Hamiltonians. Quantum Hamiltonian Complexity Reunion Workshop, Simons Institute for the Theory of Computing, University of California, Berkeley, 2015.
15. S. Gharibian, J. Kempe. Hardness of approximation for quantum problems. ELC Workshop on Inapproximability, University of Electro-Communications, Chofu, Japan, 2014.
16. S. Gharibian. Quantifying non-classicality with local unitary operations. Mini-Workshop on the General Quantumness of Correlations, University of Waterloo, Canada, 2012.
17. S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. Canadian Institute for Advanced Research (CIFAR) Quantum Information Processing meeting, Hot Topics Session, 2011.

18. D. Bruß, S. Gharibian, and H. Kampermann. Revealing quantum entanglement via locally noneffective operations. 3rd International Symposium on Quantum Interaction (QI), 2009. Presented by D. Bruß.

### Contributed Talks (in reverse chronological order)

1. (Upcoming) S. Gharibian and D. Rudolph. On polynomially many queries to NP or QMA oracles. *13<sup>th</sup> Innovations in Theoretical Computer Science (ITCS)*, 2022. Preprint at arXiv:2111.02296. To be presented by D. Rudolph.
2. J. D. Watson, J. Bausch, S. Gharibian. The complexity of translationally invariant problems beyond ground state energies. Workshop on Combinatorial Reconfiguration (CORE 2021, affiliated with ICALP 2021). Presented by J. Watson.
3. J. D. Watson, J. Bausch, S. Gharibian. The complexity of translationally invariant problems beyond ground state energies. *16<sup>th</sup> Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC2021)*.
4. A. Broadbent, S. Gharibian and H.-S. Zhou. Towards quantum one-time memories from stateless hardware. *15<sup>th</sup> Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2020)*.
5. S. Gharibian, S. Piddock and J. Yirka. Oracle complexity classes and local measurements on physical Hamiltonians. *37<sup>th</sup> Symposium on Theoretical Aspects of Computer Science (STACS 2020)*. Presented by S. Piddock.
6. S. Gharibian, S. Piddock and J. Yirka. Oracle complexity classes and local measurements on physical Hamiltonians. *23<sup>rd</sup> Annual Conference on Quantum Information Processing (QIP 2020)*. Presented by J. Yirka.
7. S. Gharibian and O. Parekh. Almost optimal classical approximation algorithms for a quantum generalization of Max-Cut. *23<sup>rd</sup> Annual Conference on Quantum Information Processing (QIP 2020)*. Presented by O. Parekh.
8. S. Gharibian and O. Parekh. Almost optimal classical approximation algorithms for a quantum generalization of Max-Cut. *Colloquium on Combinatorics (KOLKOM 2019)*.
9. S. Gharibian and O. Parekh. Almost optimal classical approximation algorithms for a quantum generalization of Max-Cut. *22<sup>nd</sup> International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX 2019)*, presented by O. Parekh.
10. (Plenary talk, top 7% of submissions) S. Gharibian, M. Santha, J. Sikora, A. Sundaram and J. Yirka. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). *18<sup>th</sup> Asian Quantum Information Science Conference (AQIS 2018)*. Presented by A. Sundaram.
11. S. Gharibian, M. Santha, J. Sikora, A. Sundaram and J. Yirka. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). *43<sup>rd</sup> International Symposium on Mathematical Foundations of Computer Science (MFCS 2018)*. Presented by A. Sundaram.



12. (Plenary talk, top 7% of submissions) M. Aldi, N. de Beaudrap, S. Gharibian and S. Saeedi. On efficiently solvable cases of Quantum k-SAT. 18<sup>th</sup> Asian Quantum Information Science Conference (AQIS 2018).
13. M. Aldi, N. de Beaudrap, S. Gharibian and S. Saeedi. On efficiently solvable cases of Quantum k-SAT. 43<sup>rd</sup> International Symposium on Mathematical Foundations of Computer Science (MFCS 2018).
14. S. Gharibian, S. Piddock and J. Yirka. Oracle complexity classes and local measurements on physical Hamiltonians (preliminary version). 18<sup>th</sup> Asian Quantum Information Science Conference (AQIS 2018). Presented by J. Yirka
15. M. Aldi, N. de Beaudrap, S. Gharibian and S. Saeedi. On efficiently solvable cases of Quantum k-SAT. Colloquium on Combinatorics (KOLKOM 2018).
16. S. Gharibian and J. Yirka. The complexity of estimating local physical quantities. Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2017).
17. N. de Beaudrap and S. Gharibian. A linear time algorithm for quantum 2-SAT. 31<sup>st</sup> Conference on Computational Complexity (CCC 2016). Presented by N. de Beaudrap.
18. N. de Beaudrap and S. Gharibian. A linear time algorithm for quantum 2-SAT. 19<sup>th</sup> Conference on Quantum Information Processing (QIP 2016).
19. S. Gharibian and J. Sikora. Ground state connectivity of local Hamiltonians. 42<sup>nd</sup> International Colloquium on Automata, Languages, and Programming (ICALP 2015). Presented by J. Sikora.
20. S. Gharibian, Z. Landau, S. W. Shin, and G. Wang. Tensor network non-zero testing. 14<sup>th</sup> Asian Quantum Information Science Conference (AQIS 2014). Long talk. Presented by S. W. Shin.
21. S. Gharibian and J. Kempe. Hardness of approximation for quantum problems. 39<sup>th</sup> International Colloquium on Automata, Languages and Programming (ICALP 2012).
22. S. Gharibian and J. Kempe. Hardness of approximation for quantum problems. 15<sup>th</sup> Workshop on Quantum Information Processing (QIP 2012).
23. D. Berry, R. Cleve and S. Gharibian. Gate-efficient discrete simulations of continuous-time quantum query algorithms. 12<sup>th</sup> Asian Quantum Information Science Conference (AQIS 2012). Presented by D. Berry.
24. D. Berry, R. Cleve and S. Gharibian. Gate-efficient discrete simulations of continuous-time quantum query algorithms. 15<sup>th</sup> Workshop on Quantum Information Processing (QIP 2012). Presented by R. Cleve.
25. S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. 26<sup>th</sup> IEEE Conference on Computational Complexity (CCC 2011).
26. S. Gharibian. Strong NP-hardness of the quantum separability problem. 11<sup>th</sup> Annual Southwest Quantum Information and Technology Workshop (SQuInT 2009).

27. S. Gharibian. Strong NP-hardness of the quantum separability problem. 5<sup>th</sup> Canadian Quantum Information Students' Conference (CQISC 2008).

### **Research Poster Presentations (in reverse chronological order)**

1. J. D. Watson, J. Bausch, S. Gharibian. The complexity of translationally invariant problems beyond ground state energies. 24<sup>th</sup> Annual Conference on Quantum Information Processing (QIP 2021). Presented by J. Watson.
2. S. Gharibian, M. Santha, J. Sikora, A. Sundaram and J. Yirka. Quantum generalizations of the polynomial hierarchy with applications to QMA(2). 22<sup>nd</sup> Annual Conference on Quantum Information Processing (QIP 2019). Presented by A. Sundaram.
3. A. Broadbent, S. Gharibian, and H.-S. Zhou. Towards quantum one-time memories from stateless hardware. 22<sup>nd</sup> Annual Conference on Quantum Information Processing (QIP 2019).
4. S. Gharibian, S. Piddock and J. Yirka. Oracle complexity classes and local measurements on physical Hamiltonians. 22<sup>nd</sup> Annual Conference on Quantum Information Processing (QIP 2019). Presented by J. Yirka. Also presented at 14<sup>th</sup> Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2019), by Stephen Piddock.
5. M. Aldi, N. de Beaudrap, S. Gharibian, and S. Saeedi. On efficiently solvable cases of Quantum  $k$ -SAT. CRA-W Grad Cohort for Women 2018. Presented by S. Saeedi.
6. M. Aldi, N. de Beaudrap, S. Gharibian, and S. Saeedi. On efficiently solvable cases of Quantum  $k$ -SAT. IBM ThinkQ Workshop, Yorktown Heights, NY, 2017. Presented by S. Saeedi.
7. M. Aldi, N. de Beaudrap, S. Gharibian, and S. Saeedi. On efficiently solvable cases of Quantum  $k$ -SAT. 21<sup>st</sup> Conference on Quantum Information Processing (QIP 2018). Presented by N. de Beaudrap.
8. M. Aldi, N. de Beaudrap, S. Gharibian, and S. Saeedi. On efficiently solvable cases of Quantum  $k$ -SAT. 50<sup>th</sup> Annual ACM Symposium on the Theory of Computing (STOC 2018). Presented by S. Saeedi.
9. S. Gharibian and J. Yirka. The complexity of estimating local physical quantities. 20<sup>th</sup> Conference on Quantum Information Processing (QIP 2017). Presented by J. Yirka.
10. S. Gharibian and J. Sikora, Ground state connectivity of local Hamiltonians. 18<sup>th</sup> Workshop on Quantum Information Processing (QIP 2015). Presented by J. Sikora.
11. D. Berry, R. Cleve, S. Gharibian. Gate-efficient discrete simulations of continuous-time query algorithms. 16<sup>th</sup> Workshop on Quantum Information Processing (QIP 2013). Presented by D. Berry.
12. S. Gharibian, J. Sikora, and S. Upadhyay. QMA variants with polynomially many provers. 15<sup>th</sup> Workshop on Quantum Information Processing (QIP 2012).

13. S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. 14<sup>th</sup> Workshop on Quantum Information Processing (QIP 2011), and Quantum Information in Many-Body Physics, 2011.
14. M. Piani, S. Gharibian, G. Adesso, J. Calsamiglia, P. Horodecki and A. Winter. All non-classical correlations can be activated into distillable entanglement. 14<sup>th</sup> Workshop on Quantum Information Processing (QIP 2011). Presented by M. Piani.
15. S. Gharibian. The computational complexity of detecting quantum entanglement. Cheriton Research Symposium, University of Waterloo, 2010.

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## STUDENT SUPERVISION

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### Ph.D. Students:

- Dorian Rudolph, Paderborn University (UPB) 2021 – present
- Funded by: DFG grant 432788384
- Jianqiang Li, Virginia Commonwealth University (VCU) 2016 – 2018
- Topic: Approximation algorithms for quantum mechanical problems
  - Funded by: NSF grant CCF-1617710
  - Currently: PhD under Sean Hallgren, Pennsylvania State Univ. (due to my move to UPB)
- Seyran Saeedi, Virginia Commonwealth University (VCU) 2015 – 2018
- Funded by: NSF grant CCF-1526189
  - Completed PhD under Tomasz Arodz, VCU (due to my move to UPB)
  - Currently: Postdoc at UC Santa Barbara

### Masters Students:

- Daniel Warkentin, Paderborn University (UPB) 2020 – present
- Topic: Quantum dynamic programming algorithms
- Jannes Stubbemann, Paderborn University (UPB) 2018 – 2020
- Thesis: “Classical simulation of quantum circuits with Restricted Boltzmann Machines”
- Dorian Rudolph, Paderborn University (UPB) 2020
- Thesis: “On the power of P with access to a QMA oracle”

### Undergraduate Students:

- Alexander Schnelle, Paderborn University (UPB) 2020 – present
- Topic: Quantum amplitude estimation algorithms
- Justin Yirka, Virginia Commonwealth University (VCU) 2015 – 2018
- Topic: Quantum computational complexity of physical problems
  - Currently: PhD under Scott Aaronson, University of Texas at Austin

- Aidan Collins, Virginia Commonwealth University (VCU) 2014 – 2015
- Topic: Computational complexity in entanglement theory
  - Funded by: VCU SoEgr Dean's Undergraduate Research Initiative grant

### Thesis Committee/Panel Member:

Suheel Shrirangapura Nazeersab, Masters (CS), Paderborn University	2021
Pontus Vikstål, Licentiate (Engineering), Chalmers University of Technology, Sweden	2021
Michael Feldmann, Ph.D. (CS), Paderborn University	2021
Till Knollmann, Ph. D. (CS), Paderborn University	2020 - 2022
Libor Caha, Ph.D. (Physics), Slovak Academy of Sciences, Slovakia	2020
Ali Karaarslan, Bachelors (CS), Paderborn University	2020
Rafael Kurek, Ph.D. (CS), Paderborn University	2018 – 2020
Björn Felklord, Ph.D. (CS), Paderborn University	2019
Alexander Mäcker, Ph.D. (CS), Paderborn University	2019
Swante Scholz, Masters (CS), Paderborn University	2019
Laurens Alexander Porzenheim, Masters (CS), Paderborn University	2019
Jakob Juhnke, Ph.D. (CS), Paderborn University	2018
Robert Jaeger, Masters (Math), Virginia Commonwealth University	2015

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## TEACHING

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### Teaching Experience

*Note on course evaluation grading systems referenced below:*

- Germany: Scale from 1 to 5, with 1,0 being perfect score.  
 U.S.A.: Scale from 1 to 5, with 5 being perfect score (i.e. backwards w.r.t. Germany).

*Course Instructor:*

- Quantum Algorithms, Paderborn University on-going  
 - Graduate course. Class size: 13.
- Seminar: Modern Approaches to Network Flow Problems, Paderborn University 2021  
 - Grad seminar course. Class size: 12.
- Seminar: Quantum Computation, Paderborn University 2019, 2020, 2021  
 - Grad seminar course, joint with Prof. Dr. Johannes Blömer. Avg class size: 14.
- Introduction to Quantum Computation, Paderborn University 2021, 2020, 2018  
 - Graduate course. Avg class size: 41. Avg course evaluation rating: 1,6.
- Proseminar: Advanced algorithms, in theory, Paderborn University 2021  
 - 4<sup>th</sup> year seminar course. Avg class size: 4.

- Quantum Complexity Theory, Paderborn University 2019, 2020  
- Graduate course. Avg class size: 9. Avg course evaluation rating: 1,3.
- Fundamental Algorithms, Paderborn University 2018, 2019  
- 3<sup>rd</sup> year course. Avg class size: 63. Avg course evaluation rating: 1,65.
- CMSC 303 Introduction to the Theory of Computation, VCU 2015, 2016, 2017  
- 2<sup>nd</sup> year course. Avg class size: 85. Avg course evaluation rating: 4.5 / 5.
- CMSC 691 Convex Optimization, VCU 2016  
- Graduate course. Class size: 21. Course evaluation rating: 4.4 / 5.
- CMSC 491 Introduction to Quantum Computation and Information, VCU 2015  
- 4<sup>th</sup> year course. Class size: 12. Course evaluation rating: 4.7 / 5.
- CS 401 Computer Algorithms I, University of Illinois, Chicago 2012  
- 4<sup>th</sup> year course. Class size: 45. Course evaluation rating: 4.8 / 5.
- CS 301 Languages and Automata, University of Illinois, Chicago 2012  
- 3<sup>rd</sup> year course. Class size: 42. Course evaluation rating: 4.8 / 5.

*Head Teaching Assistant:*

- Algorithms, University of Waterloo, 3<sup>rd</sup> year course 2010

*Instrictional/Teaching Assistant:*

- Developing Programming Principles, University of Waterloo, 1<sup>st</sup> year course 2010
- Algorithm Design and Analysis, University of Waterloo, 4<sup>th</sup> year course 2009
- Principles of Computer Science, University of Waterloo, 1<sup>st</sup> year course 2008 – 2009

## Teaching Certifications

Certificate in University Teaching, University of Waterloo 2012

- Three course program involving workshops, lecturing, and higher education research.
- Authored a response paper for workshop “Understanding the Learner”, which was judged in a written review by the program coordinator as “exceptionally well written”, and made publicly available as a model response for future students in the program.

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## SERVICE

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### International and National Service

*Newspaper interviews*

Die Zeit, “Die Mathematiker der Tafelrunde” 2020  
Major German national weekly newspaper, topic: Quantum interactive proofs

*Conference Committees and Related Service*

Board of Trustees, Secretary Computational Complexity Conference (CCC, and its organizing body, CCF)	2016 – 2018
Organizing Committee	
International Colloquium on Automata, Languages and Programming (ICALP)	2023
Dagstuhl Seminar 20311: Quantum Complexity: Theory and Application, Germany	2021
Mini-Workshop on Cryptography, Virginia Commonwealth University, USA	2014
9 <sup>th</sup> Canadian Quantum Information Students' Conference (CQISC), Canada	2012
Program Committee	
International Colloquium on Automata, Languages and Programming (ICALP)	2022
International Symposium on Algorithms and Computation (ISAAC)	2017
Asian Quantum Information Science Conference (AQIS)	2017
Conference on Theory of Quantum Computation, Communication and Cryptography (TQC)	2015, 2016
Student Travel Awards Committee	2016 – 2018
Annual Conference on Quantum Information Processing (QIP)	
Proceedings, Record Keeping, and Registration Subcommittees IEEE Conference on Computational Complexity (CCC)	2014

*Journal Editorial Boards*

Coordinating Editor Quantum, open access journal for all research related to quantum physics	2021 – present
Founding Editor Quantum, selected from among 136 applicants (acceptance ratio: 25%).	2016 – 2021

**Scholarly Reviewer***Conferences*

ACM Symposium on Theory of Computing (STOC)  
 ACM-SIAM Symposium on Discrete Algorithms (SODA)  
 Annual Conference on Quantum Information Processing (QIP)  
 Conference on Computational Complexity (CCC)  
 Conference on Theory of Quantum Computation, Communication and Cryptography (TQC)  
 IEEE Symposium on Foundations of Computer Science (FOCS)  
 Innovations in Theoretical Computer Science (ITCS)  
 International Colloquium on Automata, Languages, and Programming (ICALP)  
 International Computer Science Symposium in Russia (CSR)  
 International Symposium on Mathematical Foundations of Computer Science (MFCS)  
 Symposium on Theoretical Aspects of Computer Science (STACS)  
 Workshop on Approximation and Online Algorithms (WAOA)

*Journals*

Algorithms  
 Communications in Mathematical Physics  
 Entropy  
 Journal of the ACM  
 Nature Physics  
 npj Quantum Information  
 Physical Review A  
 Physical Review Letters  
 Physical Review X Quantum  
 Quantum  
 Quantum Information & Computing  
 Quantum Information Processing  
 SIAM Journal on Computing  
 Scientific Reports, Nature Publishing Group

*Funding Agencies*

Austrian Science Fund (FWF), Austria  
 French National Research Agency (ANR), France  
 German Academic Exchange Service (DAAD), Germany  
 National Science Foundation (NSF), USA  
 Science Committee of Armenia (SC), Armenia

*Other*

Zentralblatt (zbMATH)

**University Service***Chair*

- PhoQS Quantum Seminar Series, Paderborn University 2019 – present  
 Details: Organize, host international guests for cross-departmental quantum seminar
- Master Teacher Task Force, VCU School of Engineering 2017  
 Details: Appointed chair by Dean to improve quality of undergraduate education
- Computer Science Day, VCU 2014 – 2017  
 Details: Outreach event for high school students, 68 attendees from Virginia in 2017
- Invited workshop on NSF Funding, VCU 2016  
 Details: Organized, delivered workshop on strategies for obtaining NSF funding
- Weekly Research Seminar, Department of Computer Science, VCU 2014 – 2017

*Coordinator*

- International Student Exchange Programs, Faculty of Computer Science, Electrical Engineering, and Mathematics, Paderborn University 2019 – present

- Quantum Computing Reading Group, University of California, Berkeley 2013
- Weekly Lunch Seminar, Institute for Quantum Computing, Univ. of Waterloo 2008 – 2012

*Committee member*

- Examination Board, Department of Information Systems, UPB 2020 – 2023
- Hiring Committee, Department of Computer Science, UPB 2021
- Hiring Committee, Department of Physics, UPB 2020 – 2021
- Hiring Committee, Department of Computer Science, VCU 2016 – 2017
- High School Programming Contest, VCU 2014 – 2015

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**INDUSTRY EXPERIENCE**

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- Software developer (C++, Java, SQL), Embarcadero Technologies, Toronto, Canada 2005 – 2006
- 3D software developer, co-op (C++), Side Effects Software, Toronto, Canada Jan – Aug 2004
- Senior PC server developer, co-op, Canadian Imperial Bank of Commerce, Toronto, Canada May – Aug 2003
- Software developer, co-op (C++), Cedara Software Corp, Mississauga, Canada Sep – Dec 2002
- Software developer, co-op (Java), Third Eye Solutions Inc., Mississauga, Canada Jan – Apr 2002
- Software developer, co-op (Java, Javascript), Sun Microsystems, Inc. May – Aug 2001